HYDRAULIC REPORT

Interstate 55 (Stevenson Expressway) over East Branch of Sawmill Creek

Volume 1 of 1

August 2016

ROUTE:	FAI 55 / Interstate 55 (Stevenson Expressway)
COUNTY:	DuPage
SECTION:	
STRUCTURE NUMBER:	022-0513
PROJECT LIMITS:	over East Branch of Sawmill Creek
JOB NO.:	P-91-762-10

Prepared for:

Illinois Department of Transportation

Illinois Department of Transportation
Division of Highways – District 1
Bureau of Programming
Hydraulics Section

Prepared by:
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Illinois Department of Transportation

HYDRAULIC REPORT OUTLINE (HRO)

In order to facilitate a more efficient and timely approval of Hydraulic Reports, a "Hydraulic Report Outline" shall be prepared and submitted with each hydraulic project. This Outline shall be submitted to the District Hydraulic Engineer along with the Hydraulic Report to aid in review of the report.

If any deviations from the procedural steps below are necessary, they must be documented in the outline. Hydraulic Reports prepared by a Qualified District Hydraulic Engineer or under his supervision, are exempt from the HRO requirement. To facilitate Pump Station Hydraulic Report reviews, the Checklist and Data Sheets from the IDOT Drainage Manual, 13-303 and 13-304, will be used. The Data Sheets must be signed by the consultant's QA/QC person or the District Hydraulic Engineer.

1. SN 022-0513 (Existing); SN - (Proposed)
   Route/Stream: Interstate 55 (FAI 55) / East Branch Sawmill Creek
   County: DuPage

2. Prepared By: ☒ Consultant: Stantec Consulting Services
   ☐ District _____

3. Chapter 2 of the IDOT Drainage ☒ Yes ☐ No
   If no, explain _____
   Completed checklist (2-701.02) must be attached.

4. Design Considerations:
   a. Backwater limitations due to:
      IDNR Individual or Floodway Permit ☐ Yes ☐ No
      Sensitive Flood Receptor(s) ☐ Yes ☒ No
   b. Does proposed average design velocity through the structure exceed natural channel velocities? ☐ Yes ☐ No
   c. Is the clearance policy met? ☐ Yes ☐ No ☒ N/A
   d. Is the freeboard policy met? ☐ Yes ☒ No

5. Project scope (check all that apply):
   a. ☐ Complete replacement.
   b. ☐ Superstructure replacement.
   c. ☐ Superstructure replacement and/or widening; Length of pier extension in the water, upstream _____ ft., downstream _____ ft.
   d. ☐ Bridge ☐ Culvert
   e. ☐ New alignment
   f. Work planned below Q100 HWE: ☐ Yes ☐ No

6. Hydrology: ☐ USGS ☒ FIS ☐ Other _____
   Gage data utilized? ☐ Yes ☒ No

7. WIT: Attached copy of all completed WIT(s) ☒ Yes ☐ No Independent WIT

8. Modeling:
   a. ☒ HEC RAS ☐ WSPRO ☐ Other _____
   b. N-values estimated according to Chapter 5 of Drainage Manual? ☒ Yes ☐ No
   c. Source of starting WSE FEMA FIS Regulatory Model elevations at downstream section.
   d. Non-IDOT encroachments in survey? ☐ Yes ☒ No
      If yes, are they accounted for? ☐ Yes ☐ No
   e. Tail water controls(s)? ☐ Yes ☒ No
      If yes, list: _____
      Properly addressed? ☐ Yes ☐ No
   f. Expansion/Contraction cones addressed per Chapter 7 of Drainage Manual? ☒ Yes ☐ No
      If N/A, explain: _____

9. IDNR-OWR Permit: Drainage Area 2.73 sq. ☐ Rural; ☒ Urbanizing;
   Public Water or within Public Water boundaries ☐ Yes ☒ No
   Indicate Permit Type Required:
   a. Individual ☐
   b. Statewide #2 ☐
   c. Statewide #12 ☐
   d. Floodway ☐
   e. Other: _____
   f. None: ☒

10. Sensitive flood receptors ☐ Yes ☒ No
    Give type, elevations and locations: Potential receptors are determined to be outside of the floodplain.

    History of flooding or overtopping problems: Yes ☐ No ☒
    Sources of observed highwater: _____

11. Scour/migration problems: ☐ None/minimal ☒ Significant ☐ Severe
    Comments: Degredation scour evidenced at the downstream end of the culvert

    Ice/Debris concerns: ☒ None/minimal ☐ Significant ☐ Severe ☐
    Comments: _____

    Countermeasures proposed: _____

12. Deviations from the general procedures presented above and in Chapters 6 and 7 of the Drainage Manual: None
    (Attach supporting documents if necessary)

Prepared by: Dustin Book /Dustin Book/ Date: 08/05/2016

Signed: (AQ/QC) _____ Date: 8/12/16

HYDRAULIC REPORT

Interstate 55 (Stevenson Expressway) over East Branch of Sawmill Creek JOB NO. P-91-762-10

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Narrative

Project Description

The Illinois Department of Transportation (IDOT) is currently preparing a Preliminary Engineering and Environmental Study (Phase 1) for the I-55 Managed Lanes Project. The project study area includes the Interstate 55 corridor (Stevenson Expressway) and extends from I-355 at the southern limit and to I-90/94 at the north.

The proposed improvement involves converting the existing paved median to provide one additional travel lane in each direction. The new lane will be implemented as a "Managed Lane" along the expressway. The term 'Managed Lane' includes the implementation of traffic calming concepts within the travel lanes such as High Occupancy Vehicle (HOV), High Occupancy Toll (HOT), or Congestion Pricing to improve the overall flow of traffic. This project has been identified in the Chicago Metropolitan Area for Planning (CMAP) Go To 2040 Plan as a priority project.

This report requested by the Illinois Department of Transportation is to evaluate the existing culvert structure carrying Interstate 55 (Stevenson Expressway) over East Branch of Sawmill Creek located in DuPage County, Illinois, and determine whether or not the structure meets IDOT requirements for design freeboard and clearance. The subject box culvert is located between Cass Avenue and Clarendon Hills Road and crosses Interstate 55 approximately 4600-feet east of Cass Avenue. The total drainage area to the culvert is approximately 2.73 square miles. Refer to Exhibit A for the project location shown on the USGS Hydrologic Atlas.

Description of Existing Conditions

Site Description

East Branch of Sawmill Creek in this area flows through a well-defined channel in a southwesterly direction towards its confluence with the Sawmill Creek Main Stem. The upstream limit of the study is located approximately 1000-feet northeast of the Interstate 55 crossing. The East Branch of Sawmill Creek passes through a residential area in unincorporated DuPage County towards the single box culvert crossing beneath Interstate 55.

Downstream of the Interstate, the bearing of the Creek changes towards the west. The East Branch passes beneath Leomar Lane towards the point of confluence with the main stem of Sawmill Creek located near Cass Avenue.

The existing structure located upstream of the subject crossing is a single span bridge found at Clarendon Hills Road. The existing bridge is a single span concrete slab located on closed abutments. The bridge is aligned perpendicular to the roadway and spans 26.5-feet.

The downstream structure is located at Western Avenue. The structure is a double cell reinforced concrete box culvert with each cell measuring 12-ft wide x 9-ft high. The structure is provided at approximately 30-degree skew to the roadway with flared wingwalls provided only on the downstream end.

In general, upstream of the Interstate, East Branch of Sawmill Creek Watershed is comprised of mainly residential properties with few open areas. The watershed downstream of the crossing features few residential subdivisions and largely undeveloped land uses resulting from Forest Preserve property.

Photographs of the structure and surrounding area are included in Exhibit B.

Structure Description

The structure carrying Interstate 55 over East Branch of Sawmill Creek was originally constructed as part of Project F.A.I. 55, Sections 22-1 & 207-0101, Project I-55-6(I)269 & F-195(4) for the construction of the multi-lane expressway currently referred to as Interstate 55 in 1959.

The existing structure is a cast-in-place reinforced concrete box culvert designated as a special culvert. The overall length of the existing structure is shown to be 359'-0" measured from face of headwall to face of headwall. The opening dimensions are 12'-0" wide x 5'-0" high. Additional structural details are not included on the as-built plans.

The culvert is skewed at approximately 43-degrees to the roadway and carries three (3) 12'-0" travel lanes, a 19-0" inside shoulder, and an 11'-0" outside shoulder provided in each direction of Interstate 55. In addition, the culvert carries the north and south frontage roads located outside of the expressway. The frontage roads are comprised of a 2-lane section with aggregate shoulders.

A Typical Cross Section of the expressway and frontage roads is included as part of Exhibit E.

In addition to the flow from East Branch Sawmill Creek, the culvert serves as an outlet for the Interstate 55 roadside ditches and median. This additional flow is conveyed through several storm sewer laterals that tie directly into the culvert.

Floodplain Description

At the Intestate 55 crossing, East Branch of Sawmill Creek drains approximately 2.73 square miles of urbanized area. East Branch of Sawmill Creek is between 20 and 30-feet in width and consists of a consistent cross section throughout the study limits. The East Branch of Sawmill Creek floodplain is mapped as Zone AE by FEMA with defined base flood elevations. This extends upstream and downstream of the subject crossing, from the confluence with the main stem of Sawmill Creek, upstream to areas beyond the study limits.

Upstream of the Interstate 55 crossing, the floodplain is largely residential and is comprised of manicured lawns. The area immediately adjacent to the stream is undeveloped and consists of a stand of trees with heavy undergrowth. The mapped width of the floodplain varies from 125-feet at the widest point to 40-feet at the narrowest. The floodplain is at its widest at a point approximately 1000-feet upstream of Interstate 55.

The downstream floodplain is primarily characterized by heavy forested growth on both sides of the creek. The exception being east of the creek where residential homes are located beginning approximately 200-feet downstream of the crossing.

The Flood Insurance Rate Map No. 17043C0908H for DuPage County, Illinois and Incorporated Areas, effective December 16, 2004 is included in Exhibit C.

Historical Observations / Records

The Hydrologic Investigations Atlas, HA-149 (Sag Bridge), prepared by the United States Geological Survey in cooperation with the Northeastern Illinois Metropolitan Area Planning Commission does not show historic flooding over Interstate 55 or U.S. 66 Frontage Road on the plan view mapping. The flood profile indicates a record storm level of approximately 687.20 for the September 1961 event at the U.S. Highway 66 North Frontage Road (River mile 4.483). This high water elevation is below the low beam elevation of the subject culvert (Low Beam = 687.93) and low pavement elevation. The hydrologic atlas only covers the extreme storm events from October 1954, July 1957 and September 1961 with only the September 1961 flood mapped on the flood profile.

Note that the naming convention of the various streams referenced in the Hydrologic Atlas varies from the naming convention used as part of this report. The Atlas identifies the East Branch of Sawmill Creek as Sawmill Creek and the Sawmill Creek Mainstem is identified as Sawmill Creek Tributary. This report follows the naming conventions determined in the current FIS and Des Plaines River Study and shows the East Branch of Sawmill Creek to extend east of the main stem. A portion of the Hydrologic Atlas (HA-149) is included in Exhibit A.

No pavement flooding was reported in this area by IDOT Maintenance or the local authorities.

There are no current and functioning stream gages located in the project area. Stream gage USGS 05533400 SAWMILL CREEK NEAR LEMONT, IL is identified to be the only gage found on Sawmill Creek; however, the gage is significantly downstream of the project vicinity. The drainage area at the gage is 13.00 square miles, whereas the drainage area at the project location is 2.73 square miles. Because the drainage area at the gage is so much greater than the point of interest, the gage was not used in the analysis. The current gage was established in 1986 and is currently active. Partial records are available from this location beginning in year 1961. The gage datum is 630.00 (NGVD29) and the peak gage height of 17.53 feet was recorded on July 18, 1996. The projected peak water surface elevation is therefore 647.53 (630.00 + 17.53)

and corresponds with a discharge of 13,070 cfs. A copy of the gage documents may be found as part of Exhibit N.

In addition, the following documents were utilized in developing this report:

- *USGS Hydrologic Atlas HA-149, Sag Bridge* Quadrangle, Illinois, 1966.
- Flood Plain Information Maps and Profiles, Des Plaines River, December 1975.
- Flood Insurance Study for DuPage County, Illinois and Unincorporated Areas, Community 170197, December 4, 1985.
- Flood Insurance Study for DuPage County, Illinois and Incorporated Areas, 17043CV000H, effective December 16, 2004.
- Flood Insurance Study for DuPage County, Illinois and Incorporated Areas, 17043CV000A, effective March 2007.
- Location Drainage Study for I-55, prepared by Wight & Company, March 1994

Sensitive Flood Receptors

One (1) potential flood receptor was surveyed and was located upstream of the North Frontage Road. The surveyed locations are listed below:

Table 1. Potential Flood Receptors

Address	Receptor Description	Survey Point	Low Water Entry Point Elevation (Feet)
Homesite / Dwelling 8275 Tennessee Avenue Willowbrook, IL 60527	Building Entrance	11534	691.51

The surveyed point is located upstream of the subject bridge crossing and is reviewed as a potential sensitive flood receptor. The base (100-year) stage at the upstream face of the subject culvert is 689.19, as reflected in the Waterway Information Table (Independent Analysis). The low water entry point of the potential receptor is above the 100-year stage and the potential flood receptor is determined to be outside of the limits of the floodplain.

The locations of each surveyed point are identified in the Cross Section Location Exhibit found in Exhibit F.

Design and Analysis Procedures

Design Requirements

The analysis of the Interstate 55 culvert crossing over East Branch of Sawmill Creek was performed in accordance with the IDOT Drainage Manual

Stream Survey / Datum Correlation

Christopher B. Burke Engineering, Ltd. (CBBEL) conducted a stream survey for Interstate 55 over the East Branch of Sawmill Creek from December 2012 to January 2013. CBBEL completed the stream survey for this project and is based on the North American Vertical Datum of 1988 (NAVD88). Field survey notes and COGO generated output files provided in NAVD88 datum are included in Exhibit O.

The current FEMA FIS model and supporting documentation is presented in National Geodetic Vertical Datum of 1929 (NGVD 29). The surveyed elevations included as part of the hydraulic report, analysis, and supporting exhibits are correlated to the North Geodetic Vertical Datum of 1929 (NGVD 29), unless otherwise noted.

To convert elevations from NGVD 29 to NAVD 88 one must subtract 0.279 feet (NGVD 29 – 0.279 = NAVD 88).

Hydrologic Methodology

The source hydrology and hydraulic model is taken from the current FEMA Flood Insurance Study (FIS) for DuPage County, No. 17403CV000H. A review of the documents identifies the "Des Plaines River Flood Plain Information Maps and Profiles" report, prepared by the Des Plaines River Steering Committees, dated December 1975 as the underlying study used in the preparation of the FIS. The Des Plaines River Study includes the analysis of East Branch of Sawmill Creek as a tributary to Sawmill Creek.

Further comparison of the 2004 FIS and the 1975 Des Plaines River Study shows the placement of the mapped cross sections to be in approximately the same location for both models. The following table shows the comparison of cross section naming and locations between the two models:

Approximate Location of Cross Section	Des Plaines River Study, December 1975.	DuPage County Flood Insurance Study 17043CV000H, Effective December 16, 2004.
River Mile 3.920 (2600 ft. downstream of I-55)	Section SMW02	SWSW0027
River Mile 4.536 (650 ft. upstream of I-55)	Section SMW08	SWSW0028
River Mile 4.810 (2100 ft. upstream of I-55)	Section SMW11	SWSW0029

The model titled, "SAWMILL CREEK FLOODWAYS WITHOUT PROJECT HC1" as prepared by Harza Engineering Company (WSP2 format), dated 1975 is cited to be the underlying analysis referenced in the published FIS. The Illinois State Water Survey (ISWS) provided a copy of the original input files from Harza, working WSP2 model (titled SewM1975w.txt) dated 09/01/1982, and map exhibits for use in this study.

The design discharges identified in the 1975 Des Plaines River Study are considered to be the regulatory discharges and are used as part of the analysis. The 1975 WSP2 model provides discharges only for the 10- and 100-year frequencies. The 50- and 500-year discharges were plotted on a log-log scale and the flood values were estimated by straight line interpolation (50-year) and extrapolation (500-year). A copy of the plot is provided as part of the calculations.

The summary of the cited discharges and stages from the 1975 WSP2 regulatory model is contained in Table 2 as follows:

Table 2. Summary of Discharges – 1975 WSP2 Regulatory Model & Interpolated Values

Section	Drainage Area (Square Miles)	Peak Discharges (CFS)					
		5-Year	10-Year	25-Year	50-Year*	100-Year	500-Year*
Section SMW02 River Mile 3.920 (2600 ft. downstream of I-55)	3.3	285.86	385.63	502.41	615	732.97	1000
Starting Water Surface Elevation		677.6	678.0	678.6	678.9	679.2	679.9
Section SMW08 River Mile 4.536 (650 ft. upstream of I-55)	2.73	240.60	324.77	423.28	520	617.38	860
Section SMW11 River Mile 4.810 (2100 ft. upstream of I-55)	2.48	220.48	297.70	388.08	475	565.98	775
Section SMW17 River Mile 5.359 (5000 ft. upstream of I-55)	2.07	187.08	252.75	329.60	405	480.59	680
2004 FIS – Table 3: East Branch Sawmill Creek River Mile 5.317 At 79th Street	2.10	N/A	253	N/A	410	481	690

* Designates the values provided for the water surface elevations and discharge value are interpolated/extrapolated from the FIS data.

The discharge values and estimated results provided from the 1975 Harza model were compared to the results published in the current 2004 FIS on Table 3 – Summary of Discharges. This was done to verify that the 2004 FIS uses the 1975 Harza model for its underlying analysis. The 2004 FIS only reports discharges for the East Branch Sawmill Creek at 79th Street. This is the approximate location of Section SMW17 in the WSP2 model. When compared, the published values of the FIS appear to correlate with the

WSP2 model in terms of both drainage area and peak discharges. This shows that the 1975 Harza model can be used to provide regulatory discharges at other locations not provided in the published FIS.

The ISWS also provided a WSP2 model titled, "DARIEN AND WILLOWBROOK – FLOOD INSURANCE STUDIES" for the East Branch of Sawmill Creek bearing a revision date of 03/11/1974. However, the downstream limit of the study commences at Section SMW11, which is the upstream end of the study limits. As a result, the provided study is deemed to be outside the study limits and is not included in the analysis.

A previous Location Drainage Study conducted for Interstate 55, prepared by Wight & Company in March of 1994, includes an analysis for the East Branch Sawmill Creek crossing. The design discharges used on the LDS were found to match the discharges provided in and estimated by the WSP2 model as part of this report.

Hydraulic Methodology

Select portions of the FIS regulatory model, "SAWMILL CREEK FLOODWAYS WITHOUT PROJECT HC1" as prepared by Harza Engineering Company (WSP2 format), dated 1975 were obtained from the ISWS and served as a basis of the hydraulic analysis.

The geometric and flow input data provided in FIS regulatory this model (WSP2 format) was converted into HEC-RAS v4.1.0 to validate the provided WSP2 model and to establish a working model of the given data set. This working HEC-RAS model is titled, FIS-Base Model (Plan 01). Only the three (3) cross sections located within the limits of the East Branch Sawmill Creek study were included in this model. These are:

- SMW02 (River Mile 3.920) at the downstream limit,
- SMW08 (River Mile 4.536), and
- SMW11 (River Mile 4.810) at the upstream limit.

The resulting study area reaches approximately 2600 feet downstream and 2100 feet upstream of the subject crossing at Interstate 55. The water surface profiles begin at the downstream cross section, FIS Section SMW02, where the starting water surface elevations are defined by the stages provided in the FIS study and as outlined previously.

The initial results of the FIS–Base Model (Plan 01) generally displayed small variances in the calculated water surface elevations when compared to the source data. This is because the hydraulic routines used in WSP2 are different from those used in HEC-RAS. In an attempt to reproduce the results of the previous study, the following steps were taken, in this order, to ensure accuracy in the modeling and to calibrate the HEC-RAS model to reflect the WSP2 results:

- The WSP2 data was checked to make sure it was input accurately into the model and that it seemed reasonable.

- Additional cross sections were added using the HEC-RAS interpolation function to ensure the program did not default to a critical depth solution. The sections were provided at a 250-foot interval throughout the study limits.
- The Manning's n value for the channel of the most upstream cross section, SMW11 (River Mile 4.810), was increased from 0.070 to 0.075. This is within the realistic range of n-values for this location.

The resulting stages calculated in HEC-RAS FIS-Base Model (Plan 01) are found to be within 0.1 feet of the given conditions. A comparison of the various water surface elevations are presented in the following table.

Table 3. Comparison of Calculated Water Surface Elevations WSP2 (Given Conditions) vs. HEC-RAS Model (Plan 01)

Section	River Mile	Design Event	FIS WSP2 Model (Given Conditions)	HEC-RAS Model Plan 01: FIS – Base Model	Calculated Difference from Given Data
SMW 02	3.920	10-Year	678.0	678.00	0.00
		100-Year	679.2	679.20	0.00
SMW 08	4.536	10-Year	688.3	688.21	-0.09
		100-Year	689.6	689.63	+0.03
SMW 11	4.810	10-Year	693.2	693.16	-0.04
		100-Year	694.6	694.53	-0.07

The calibrated model, Plan 01, serves as the basis of the hydraulic analysis and the corresponding IDOT Design. The surveyed cross sections and structure geometry were incorporated into the Plan 01 model to evaluate the existing conditions.

The input data and results of the HEC-RAS model for RAS FIS-Base Model (Plan 01) are provided as part of Exhibit C.

Summary of Hydraulic Analysis

Existing Conditions Analysis

The existing conditions were evaluated independently by means of a HEC-RAS plan titled, IND-Existing Conditions (Plan 02). Plan 02 incorporates the field measured geometry of the subject culvert and the CBBEL surveyed cross sections into the FIS–Base Model (Plan 01) HEC-RAS geometry.

An independent evaluation of Manning's "n" roughness coefficient values for the channel and floodplain was prepared for use in the HEC-RAS analysis and is contained in Exhibit G. The values are based on field site visits and procedures defined in Chapter 5 of the IDOT Drainage Manual. The independent evaluation produced roughness coefficient values that generally compared to those values used in the FIS model with the exception of the outer edges of the floodplain characterized by residential developments. The FIS regulatory model did not provide a change in the Manning's "n" value for surfaces characterized as residential areas consisting of manicured lawns and defined the floodplain uniformly as part of the study. As a result, the roughness coefficients presented in the IND-Existing Conditions (Plan 02) model reflect the calculations identified in the Independent analysis. Refer to Exhibit G for the Manning's Roughness Calculations. A comparison of FIS-Base Model (Plan 01) and IND-Existing Conditions (Plan 02) is shown in Table 4 below. This shows the differences in the regulatory water surface elevations and the water surface elevations when incorporating current survey data.

Table 4. Comparison of HEC-RAS Calculated Water Surface Elevations FIS Model (Plan 01) vs. Existing Conditions (Plan 02)

Section	River Mile	Design Event	HEC-RAS Model Plan 01: FIS – Base Model	HEC-RAS Model Plan 02: IND – Existing Conditions	Calculated Difference from Given Data
SMW 02	3.920	10-Year	678.00	678.00	0.00
		100-Year	679.20	679.20	0.00
SMW 08	4.536	10-Year	688.21	688.51	+0.30
		100-Year	689.63	691.20	+1.57
SMW 11	4.810	10-Year	693.16	693.45	+0.29
		100-Year	694.53	694.83	+0.30

As can be seen from the above table, the inclusion of the Manning's "n" values, CBBEL surveyed cross sections and culvert geometry results in an increase of the calculated water surface profile for the existing conditions model (Plan 02) and the results do not match the FIS regulatory profile (Plan 01) to the allowable tolerances of 0.10-feet. The variation in the calculated water surface elevations due to several reasons:

- The FIS regulatory model (1975 Harza WSP2) does not include the culvert crossing at Interstate 55.
- The CBBEL cross sections referenced in Plan 02 identify a narrowing in the channel between sections SMW08 and SMW11, causing an increase in the water surface elevation. This narrowing is not included in the FIS cross sections included in Plans 01.

However, the project is located in an area without a designated floodway and is governed by the IDNR Part 3700 rules. As such, the Independent model, with the surveyed cross sections and culvert geometry will serve as the basis of both the IDOT design requirements and permitting requirements. It should be noted that though earlier regulatory studies included floodway delineation at I-55 based on the available WSP-2 model, the recent publications of the FEMA FIRM map omitted the floodway delineations in the vicinity of I-55 crossing.

Natural Conditions Analysis

A natural conditions analysis is done in order to calculate the natural high water elevations for the Waterway Information Table. Natural conditions are defined as the creek without any manmade structures, such as the East Branch Sawmill Creek culvert crossing.

The independent analysis natural conditions model was created by removing the geometry information for the culvert carrying Interstate 55 and the defining upstream and downstream cross sections from the IND – Existing Conditions (Plan 02) model. This new HEC-RAS plan is titled, IND – Natural Conditions (Plan 03). These cross sections were replaced by a new cross section placed at the upstream face of the Interstate 55 culvert, River Station = 4.449. The natural geometry of this cross section is simulated using the HEC-RAS software. HEC-RAS generates the cross section geometry through linear interpolation of the various points and elevations provided at the nearest upstream and downstream sections. The corresponding water surface elevations at this cross section location are used in the calculations.

For the independent analysis, the fully-effective approach cross section is taken as River Mile =4.504 and is located approximately 304-feet upstream of the Interstate 55 Culvert. This was performed as defined by current standards, where the location and amount of created head is determined by comparing the amount of head generated between the natural and existing conditions at each of the upstream cross section locations. The cross section resulting in the greatest value of created head is used in the hydraulic analysis and identified in the WIT. Refer to the WIT back-up calculations for the Determination of Created Head calculations for the Independent analysis.

The input data and results of the HEC-RAS models for the Natural and Existing Conditions are summarized in Exhibits I and J respectively and digital version of these models is also contained in Exhibit P.

Summary of HEC-RAS Models

FIS – Base Model (Plan 01) – This model uses the historic WSP2 model cross sections and was calibrated to match the WSP2 water surface elevations. It does not include the culvert geometry. This model serves to calibrate the given WSP2 input data for use in HEC-RAS.

IND – Existing Conditions (Plan 02) – This model incorporates all of the cross section and culvert geometry survey data that was taken for this project. It is considered the existing conditions model that will be used for the WIT.

IND – Natural Conditions (Plan 03) – This model is a duplicate of Plan 02, however it removes the three cross sections that define the culvert, and replaces them with an interpolated cross section at the upstream face of the culvert. This is to model the natural conditions of the creek as if the box culvert did not exist.

Scour Analysis

The streambed survey conducted by CBBEL indicates the degradation of the stream bed located immediately downstream of the culvert as evidenced by the presence of a scour hole. The surveyed elevations of the streambed indicate a drop of approximately 4-feet between the downstream invert elevation and the streambed elevation.

As part of the proposed conditions, it is recommended that the scour hole be filled and the channel be restored to the general flow line of the stream.

Description of Proposed Structure

As a result of the limited nature of the expressway improvements proposed as part of the I-55 Managed Lanes project, the replacement of the existing culvert is not proposed at this time. The scope of the project does not result in the reconstruction of the expressway and a culvert replacement would require staging and lane closures unrelated to the roadway improvements.

Culvert Inspection Reports provided by the IDOT Bridge Office note the existing structure to be in fair condition. The reports prepared on the existing culvert note the need for the following repairs that should be made to the existing culvert:

- Formed concrete repair at locations within the structure to repair spalls
- Repair the separation observed between the headwall and the barrel section at the downstream end of the structure.
- Repair the crack at the north end of the structure.
- Repair the scour at the northeast wingwall.

The existing structure shall remain in place and the suggested repairs to the culvert are implemented. The Structure Inspection reports are provided in Exhibit N for reference.

The existing conditions of the stream crossing provide edge protection to the low edge of pavement for all design events. The proposed improvements should include a profile raise along N. Frontage Road to bring the low elevation of pavement to meet the required 3-feet freeboard for the 50-Year Design Frequency.

Compensatory Storage

The scope of the project for this structure is limited to performing necessary repairs and maintenance to the existing culvert. Compensatory storage is not required for maintenance activities related to existing structures and is not required as part of this project.

IDNR Permit Requirements

The Illinois Department of Natural Resources – Division of Water Resource Management (DWRM) issues permits for work in and along the rivers, lakes and streams of the state. The Division regulates construction projects that may impact the flood carrying capacity of the rivers, lakes and streams.

The Part 3700 rules of the Illinois Department of Natural Resources states that "all construction activities in the floodway of stream in urban areas where the one square mile or more…must be permitted by the Division prior to construction."

The drainage area tributary to the proposed crossing is approximately 2.73-square miles. Therefore, this project does fall under jurisdiction of the IDNR-OWR and a permit may be required pending the scope of the planned improvements, unless noted to be an exempted activity. A number of common minor construction activities regulated under the Part 3700 rules and are automatically authorized by statewide permits. A permit application submittal to the Division is not needed for a construction activity that meets the terms and conditions of a statewide permit.

Routine maintenance and repair of existing culvert structures and the maintenance and repair stream channels are considered activities that are exempt from the Part 3700 rules and do not require a permit.

The stream crossing of the East Branch Sawmill Creek and Interstate 55 does not include a designated floodway. Therefore the IDNR Part 3708 rules of the IDNR do not apply to this project.

The Independent Analysis of the stream crossing will serve as the basis of all permitting activities.

The scope of the project for this structure is limited to performing necessary repairs and maintenance to the existing culvert. Maintenance activities are exempt from the permitting requirements of the IDNR.

Freeboard / Clearance

The IDOT Drainage Manual requires a minimum of three feet freeboard between the calculated design (50-year) headwater elevation and the edge of pavement. In addition, the base (100-year) headwater should not overtop the roadway. The low edge of pavement elevation is 690.86, found on N. Frontage Road at Station 432+68.68. The low overtopping elevation in the vicinity of the culvert is 691.24 found along the centerline of Interstate 55 at Station 432+21.71. The independent hydraulic analysis, IND-Existing Conditions (Plan 02), indicates the existing culvert does not meet the criteria for freeboard. However, it does meet the criteria for overtopping, as the overtopping elevation is above the base (100-year) flood headwater.

Table 5. Freeboard Results

Storm	Water Surface Elevation	Low Edge of Pavement	Provided Freeboard (ft)
50-year	688.23	690.86	2.63
100-year	689.37	690.86	1.49

The Manual further states the 2-feet clearance between the design natural high-water and the low beam elevation does not apply to culverts. Therefore this analysis was not performed.

Conclusions

The existing condition analysis concludes that the existing culvert carrying Interstate 55 and Frontage Roads over the East Branch of Sawmill Creek does not meet the IDOT requirements for design freeboard. Although no parts of the roadway are overtopped during the base flood event, the low roadway profile of North Frontage Road would need to be raised approximately 0.37-feet at the low point to provide the minimum three feet of freeboard for the 50-year event.

The recommended improvement at the East Branch Sawmill Creek stream crossing is to raise the profile of N. Frontage Road approximately 0.37-feet at the low grade to meet the freeboard planning objectives. The raised roadway profile results in the required 3-foot freeboard for the 50-year design and continues to provide edge protection to the 100-year design.

In addition, structural repairs to the existing culvert should be performed as indicated in the Culvert Inspection Report.

The project scope of the I-55 Managed Lanes project does not call for reconstruction through the expressway. As a result, it is not suggested that the existing structure be replaced at this time.

Although current scope of work for the subject culvert is minor, it should be noted that in the future, if the culvert will need replacement, it should be replaced with a larger opening to reduce the overall velocity through the culvert. The culvert velocity is considered to be high, in general, and especially when compared to the streambed velocity. The current situation result is the scour/erosion occurring downstream of the culvert. Also, in general, the streambed upstream and downstream of the culvert seems to have receded when compared to the culvert' inverts. In the future, placing the new culvert inverts in line with the streambed flowline is advisable

Illinois Department of Transportation

Culvert Waterway Information Table
Independent Analysis

Route: Interstate 55 (FAI 55)
Waterway: East Branch Sawmill Creek
Section:
County: DuPage

Existing SN: 022-0513
Proposed SN:
Prepared by: Dustin Book / DJB Date: 08/05/2016
Checked by: Date: 8/12/16

Drainage Area = 2.73 square miles

Existing Overtopping Elev. = 691.24 at Sta. 432+21.71 (I-55)
Proposed Overtopping Elev. = at Sta.

Flood Event	Freq. Yr.	Discharge ft^3/s	Waterway Opening - ft^2		Natural H.W.E. - ft	Head - ft		Headwater Elevation – ft	
			Existing	Proposed		Existing	Proposed	Existing	Proposed
	10	325	33		685.6	0.8		686.4	
Design	50	520	43		686.5	1.8		688.2	
Base	100	617	47		686.8	2.5		689.4	
Scour Design Check									
Overtop Existing	>500	>860							
Overtop Proposed									
Max. Calc.	500	860	56		687.6	2.8		690.4	

Datum:

All-Time H.W.E. & Date: September 1961 / 687.20 (approx.) ft
Surveyed Normal Water Level: 683.48 ft

10-Year Velocity through Existing Structure = 9 ft/s
10-Year Velocity through Proposed Structure = ft/s
2-Yr. Flow Rate = 160 ft^3/s

EXISTING STRUCTURE

Type: Reinforced Concrete Box Culvert
Length/Width: 12' W x 5' H x 359.6' L
Spans/Cells: 1
Low Chord: 687.93 (d/s) 686.71 (d/s)
Skew: 43-degrees (relative to road)
Clearance: N/A
Bridge Flow Line: N/A (u/s) N/A (d/s)
Low E.O.P: 690.86 (Sta. 432+68.68 N. Frontage Rd.)
Freeboard: 2.63-feet
Culvert Inverts: 682.93 (u/s) 681.71 (d/s)

PROPOSED STRUCTURE

Culvert Type:
Length Of Span:
Cells:
Top Of Crown Elev.: Beam:
Skew: (relative to road)
Culvert Invert Elev.: (u/s) (d/s)
Low E.O.P:
Freeboard:

EXISTING EMBEDMENT

Depth: 0.0-feet
U/S Streambed Elev.: N/A
D/S Streambed Elev.: N/A

PROPOSED EMBEDMENT

Depth:
U/S Streambed Elev.:
D/S Streambed Elev.:

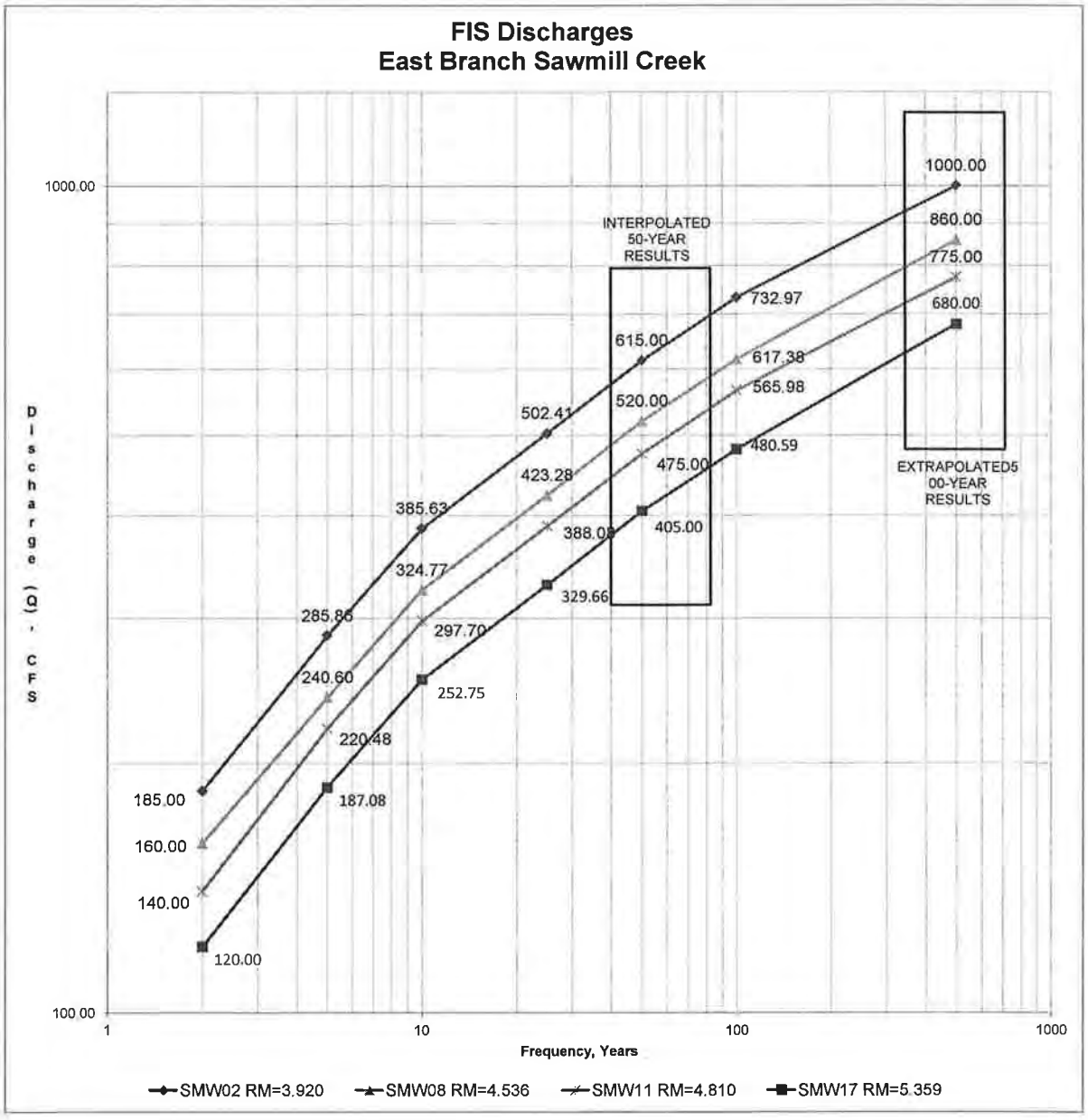
NOTE(S):
1. Proposed Structure Details Are Preliminary; Subject To Refinement In TSL Stage.
2. The opening calculations consider the skew angle and the resulting opening is measured perpendicular to the stream.
3. Elevations are provided in NGVD29 datum. Subtract 0.279-feet to achieve NAVD88 (NGVD29 - 0.279 = NAVD88).

FIS Discharges - East Branch of Sawmill Creek

Route: Interstate 55 (FAI 55) S.N. Exist: 022-0513 Calc By: DJB 8/5/16
Section: S.N. Prop:
County: DuPage Waterway: East Branch of Sawmill Creek Chk'd By: CAI 8/12/16

Frequency (Year)	Starting Water Surface Elevation (Section SMW02)	Discharge, Q (CFS)			
		SMW02 RM=3.920	SMW08 RM=4.536	SMW11 RM=4.810	SMW17 RM=5.359
2		185.00	160.00	140.00	120.00
5	677.6	285.86	240.60	220.48	187.08
10	678.0	385.63	324.77	297.70	252.75
25	678.6	502.41	423.28	388.08	329.66
50	678.9	615.00	520.00	475.00	405.00
100	679.2	732.97	617.38	565.98	480.59
500	679.9	1000.00	860.00	775.00	680.00

NOTE(S): 1.) 2-, 50- and 500-year discharges are interpolated/extraploted graphically from the Harza WSP2 model data.
2.) 50- and 500-year starting water surface elevations are interpolated/extrapolated linearly from Harza WSP2 model data



WIT BACK-UP CALCULATIONS - INDEPENDENT ANALYSIS

Route: Interstate 55 (FAI 55)
Waterway: East Branch Sawmill Creek
Section
County DuPage

Exisitng SN: 022-0513
Proposed SN:
Calc by: Dustin Book / DJB 8/5/16
Chck by: [signature] 8/12/16

Calculate Created Head

Design Frequency	Natural HWE [1] (ft) U/S Face of Structure	Max. Created Head [2] (ft) Existing	Max. Created Head [2] (ft) Proposed	Exist. Headwater Elevation [3] (ft) U/S Face of Structure	Prop. Headwater Elevation [3] (ft) U/S Face of Structure
10-Year	685.65	0.77		686.42	
50-Year	686.48	1.75		688.23	
100-Year	686.84	2.53		689.37	
500-Year	687.60	2.84		690.44	

NOTE(S):

The Hydraulic models and supporting calculations are provided in NGVD29 datum.

(1) The natural highwater elevation is the water surface elevation at the upstream side of the crossing, as modeled in the stream natural conditions, without the structure (RS = 4.449).

(2) The created head is taken at the upstream approach cross section resulting in the greatest difference in water surface elevation between the nautral conditions and existing conditions. The difference in elevation is then added to the natural H.W.E. at the U/S face of structure. This method of calculating created head is only required for bridges and some major culvert crossings. Also, the preferred created head should never be negative. The created head at the upstream face of the culvert is not considered for this calculation.

(3) Headwater elevation = Natural H.W.E. + Created Head. Refer to Water Surface Elevation Table for calculations.

Calculate Freeboard and Clearance

Low Road Elevation (ft) [4]			
Existing	Station	Proposed	Station
690.86	432+68.68		
Low Beam Elevation (ft) [5]			
Existing	Station	Proposed	Station
687.93	430+07.77		
Existing / Proposed Freeboard (ft) [6]			
10-Year	50-Year	100-Year	500-Year
4.44	2.63	1.49	0.42
0.00	0.00	0.00	0.00
Existing / Proposed Clearance (ft) [7]			
10-Year	50-Year	100-Year	500-Year
Not Applicable to Culvert			

(4) Low Road Elevation is calculated at the edge of pavement, at the low side of the roadway (N. Frontage Rd)

(5) The Low Beam Elevation is taken at the upstream end of the culvert.

(6) Freeboard is calculated from the headwater elevation to the proposed low road elevation in the floodplain (3-ft minimum requirement for the design event)

(7) Vertical clearance is not applicable to culverts

CREATED HEAD CALCULATIONS - INDEPENDENT ANALYSIS

Route: Interstate 55 (FAI 55)
Waterway: East Branch Sawmill Creek
Section
County: DuPage

Exisitng SN: 022-0513
Proposed SN:

Date: 8/5/2016

X-Section	River Mile	Frequency	Water Surface Elevation			Created Head	
			IND-Natural Conditions Plan 03	IND-Existing Conditions Plan 02	Proposed	Existing Conditions	Proposed Conditions
SMW11	4.81	10-Year	693.46	693.46		0.00	
		50-Year	694.47	694.48		0.01	
		100-Year	694.83	694.84		0.01	
		500-Year	695.44	695.47		0.03	
60+00	4.635	10-Year	690.67	690.70		0.03	
		50-Year	691.85	691.94		0.09	
		100-Year	692.32	692.50		0.18	
		500-Year	693.13	693.35		0.22	
64+92.35	4.542	10-Year	688.07	688.51		0.44	
		50-Year	688.88	690.10		1.22	
		100-Year	689.17	691.16		1.99	
		500-Year	689.80	692.17		2.37	
SMW08	4.536	10-Year	688.10	688.54		0.44	
		50-Year	688.95	690.15		1.20	
		100-Year	689.30	691.20		1.90	
		500-Year	689.99	692.21		2.22	
66+86.62	**4.504**	**10-Year**	687.45	688.22		**0.77**	
		50-Year	688.26	690.01		**1.75**	
		100-Year	688.59	691.12		**2.53**	
		500-Year	689.29	692.13		**2.84**	
69+83.28	4.449 (U/S Face of Culvert)	10-Year	685.65	687.63		1.98	
		50-Year	686.48	689.53		3.05	
		100-Year	686.84	690.74		3.90	
		500-Year	687.60	691.78		4.18	
71+72	4.413	Existing Culvert Structure					

WATERWAY OPENING CALCULATIONS - INDEPENDENT ANALYSIS

Route: Interstate 55 (FAI 55)
Waterway: East Branch Sawmill Creek
Section
County: DuPage

Exisitng SN: 022-0513
Proposed SN:

Date: 8/5/2016

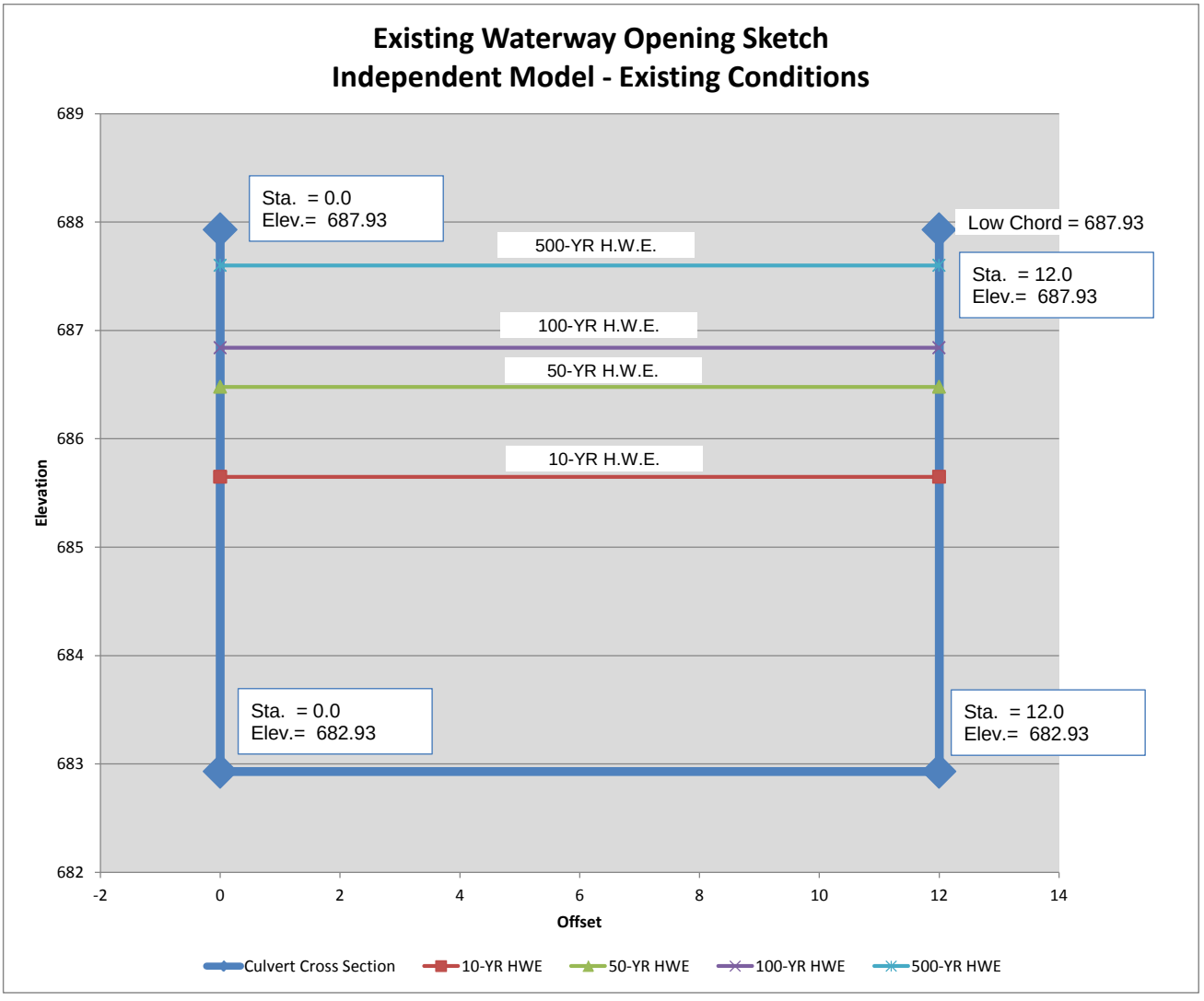
Calculated Opening:

Frequency	H.W.E.	L.B.	Waterway Opening Area Ft^2
10 Year	685.65	687.93	33.00
50 Year	686.48		43.00
100 Year	686.84		47.00
500 Year	687.60		56.00

Calculations:

Frequency	Width*	L.B.	H.W.E.	Inv. EL.	Dep. Below Low Beam	Dep. Below H.W.E.	Area Under Low Beam	Area Under H.W.E.	Waterway Opening
10 Year	12	687.93	685.65	682.93	5.0	2.72	60.00	32.64	32.64
50 Year			686.48			3.55		42.60	42.60
100 Year			686.84			3.91		46.92	46.92
500 Year			687.60			4.67		56.04	56.04

NOTE(S): 1.) Width is measured perpendicular to flow.



III. HYDRAULIC REPORT DATA SHEETS

Illinois Department of Transportation

Hydraulic Report Data Sheets

Route	Interstate 55 (FAI 55)	P or D #	P91-762-10
Section		PTB #	158/002
County	DuPage		
Exist SN	022-0513		
Prop SN			

General Information

1. Name of the Stream: East Branch Sawmill Creek

2. Location of the Structure: NE ¼ of the SE ¼ of Section 34, Township 38N, Range 11E of the 3rd P.M.

3. Hydraulic Report Prepared By: ☒ Consultant Stantec Consulting Services
   ☐ District

4. Hydraulic Report Approval Authority: ☒ District – Post PDF of HR to BBS Hydraulics SharePoint Server
   ☐ BBS Hydraulics - Submit 2 hard copies of HR to BBS Hydraulics

Site Design Data

5. Drainage Area (sq. mi.): 2.73 square miles

6. Highway Classification:
   ☐ Rural ☒ Urban ☐ Other
   ☒ Principal Arterial ☐ Minor Arterial ☐ Collector ☐ Local

7. Design Frequency: ☐ 30 yr ☒ 50 Yr. ☐ Other

8. Number of Waterway Information Tables (WIT): 1
   If more than one, explain:

Hydrologic & Hydraulic Analysis

9. Hydrology Modeling (check all that apply): ☐ USGS/Stream Stats ☒ FIS ☐ Gage Data
   ☐ Other

10. Hydraulic Modeling (check all that apply):
    a. Method: ☒ HEC-RAS ☐ WSPRO ☐ Other
    b. Manning's "n" values determined as per IDOT DM CH.5? ☒ Yes ☐ No
       If no, explain:
    c. Source of Starting WSE: FIS Regulatory Model
    d. Non- IDOT encroachments in Survey? ☐ Yes ☒ No
       If yes, are they accounted for? ☐ Yes ☐ No
    e. Does the Tailwater Control? ☐ Yes ☒ No
       If yes, list:
    f. Were the Expansion/Contraction cones properly addressed? ☒ Yes ☐ No ☐ N/A
       If No or N/A, explain:

g. What Expansion and Contraction Rates were used? Expansion: 1:1 (X:1)
Contraction 4:1 (X:1)

IDNR – OWR Floodway Permit

11. Is area experiencing urbanization or expected to urbanize within 10 years? ☒ Yes ☐ No

12. Are there any sensitive flood receptors located upstream within possible backwater influence? ☐ Yes ☒ No
If yes, list and describe critical upstream flood damageable properties and their elevations.
Potential receptors area determined to be outside the limits of the floodplain.

13. Is there any History of Flooding or Overtopping problems? ☐ Yes ☒ No
Sources of Observed Highwater:

14. Is the structure hydraulically connected to or within the floodway of an IDNR-OWR designated Public Body of Water? ☐ Yes ☒ No

15. Required IDNR - OWR Permit type:
☐ Individual ☐ SWP #2 ☐ SWP #12 ☐ Floodway
☐ None ☐ Other

Proposed Structure Data

16. Project Scope (check all that apply):
a. ☐ Complete Replacement
b. ☐ Superstructure Replacement
c: ☐ Superstructure Widening; Length of Pier Extension in the water:
U/S D/S
d. ☐ Bridge ☐ Culvert
e. ☐ New Alignment
f. Work Planned Below Q_{100} HWE? ☐ Yes ☐ No
g. ☐ Profile Raise

17. If a bridge is proposed, supply:
Flow line elevation (ft): Abutment type:
Preliminary low beam elevation (ft): Skew (degrees):
Width of deck (ft): Number of spans:
Total length from face to face of abutment (ft)

18. If a culvert is proposed, supply:
Type and size: Length (ft):
Upstream invert elevation (ft): Entrance type:
Downstream invert elevation (ft): Skew (degrees):
Note: Upstream and downstream elevations should reflect the elevations before the 3" drop is applied

19. If a three-sided structure is proposed, supply:
Flow line elevation (ft): Skew (degrees):
Span (ft): Length (ft):
Height (ft): Number of spans:

20. a. Is the IDOT Clearance Policy Met? ☐ Yes ☐ No ☒ NA Value (ft):
b. Is the IDOT Freeboard Policy Met? ☐ Yes ☒ No ☐ NA Value (ft): 2.63-feet

21. Type of streambed soil : ☒ Clay ☐ Silt ☐ Sand ☐ Loam ☐ Orthents Clayey (USDA Soil Survey)

22. Scour/ Migration Problems: ☐ None/Minimal ☒ Significant ☐ Severe
Comments: Degredation scour is evidenced at the downstream end of the culvert

Ice Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Debris Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Countermeasures Proposed:

Existing Structure Data

	Structure U/S	Subject Structure	Structure D/S
23. Distance from proposed structure: (ft.)	2,050 feet	Project Location	1,830 feet
24. Type of structure:	Single Span Bridge @ 26.5-ft	12'W x 5' H RCBC	12' W x 9' H RCBC (2-cells)
25. Low beam elevation:	695.72	687.93	678.47
26. Flow line elevation:	688.72	682.93	669.47
27. Maximum known high water elevation:	693.4	687.20	682.3
28. Date of maximum high water:	September 1961	September 1961	September 1961
29. Cause (backwater, headwater, etc.):	Headwater	Headwater	Headwater
30. Does structure carry entire design flood flow?	☐ Yes ☐ No	☒ Yes ☐ No	☐ Yes ☐ No
If not, state area of additional waterway opening: (ft^2)	N/A		N/A
31. Type and size of existing overflow structures:	Unknown	None - overtop storms >100-YR	Unknown
32. Has adverse scour occurred under or adjacent to the structure?	N/A	Yes	N/A
33. Classify type of scour and/or aggradation / degradation:		Degradation	

Required Additional Data

34. Deviations from the General Procedures presented in IDOT DM CH. 2, CH.6, and CH.7:
None

35. Information regarding high water from other streams, reservoirs, flood control projects, proposed channel changes, or other controls affecting proposed waterway area:
None

36. Site Inspection made by: Dustin Book Date: January 16, 2013

Remarks:

37. Prepared by: Dustin Book / Dustin Book Date 08/05/2016

Signed (QA/QC): Date 8/12/16

Hydraulic Report Checklist

The District or Consultant should complete the following checklist before submitting the Hydraulic Report for approval.

1. ☒ Title Page
2. ☒ Table of Contents
3. ☒ Narrative - (as outlined in Section 2-601.01 Item #3)
4. ☒ Waterway Information Table (WIT) - (as outlined in Section 2-601.01 Item #4)
5. ☒ Hydraulic Report Data Sheets
6. ☒ Location Map - should show the subject structure along with nearby location defining landmarks (cities, roads, highways, etc.)
7. ☒ USGS Hydraulic Investigation Map (District 1 only)
8. ☒ Photographs - (Minimum: U/S & D/S Structure Faces, Up & Down Channel, Up & Down Roadway Across Structure)
9. ☒ Hydrology (map and calculations)
10. ☒ Streambed Profile
11. ☒ Roadway Profile (existing and proposed)
12. ☒ Cross Section Plots - with plan layout preferably overlayed upon an aerial photo with the contours
13. ☒ Bridge Opening Plots
14. ☒ Natural Condition Analysis
15. ☒ Existing Condition Analysis
16. ☐ Proposed Condition Analysis

When HEC-RAS modeling is being used, ALL Plans (Natural, Existing, & Proposed) shall be included in ONE Project File.

17. N/A Scour Analysis – Existing and Proposed Conditions
18. ☐ Compensatory Storage Calculations (if required)
19. ☒ Survey Notes (if available, No Electronic Point Files)
20. ☒ Correspondence Notes
21. ☒ CD with Project Files (Include pdf copy of the Hydraulic Report)

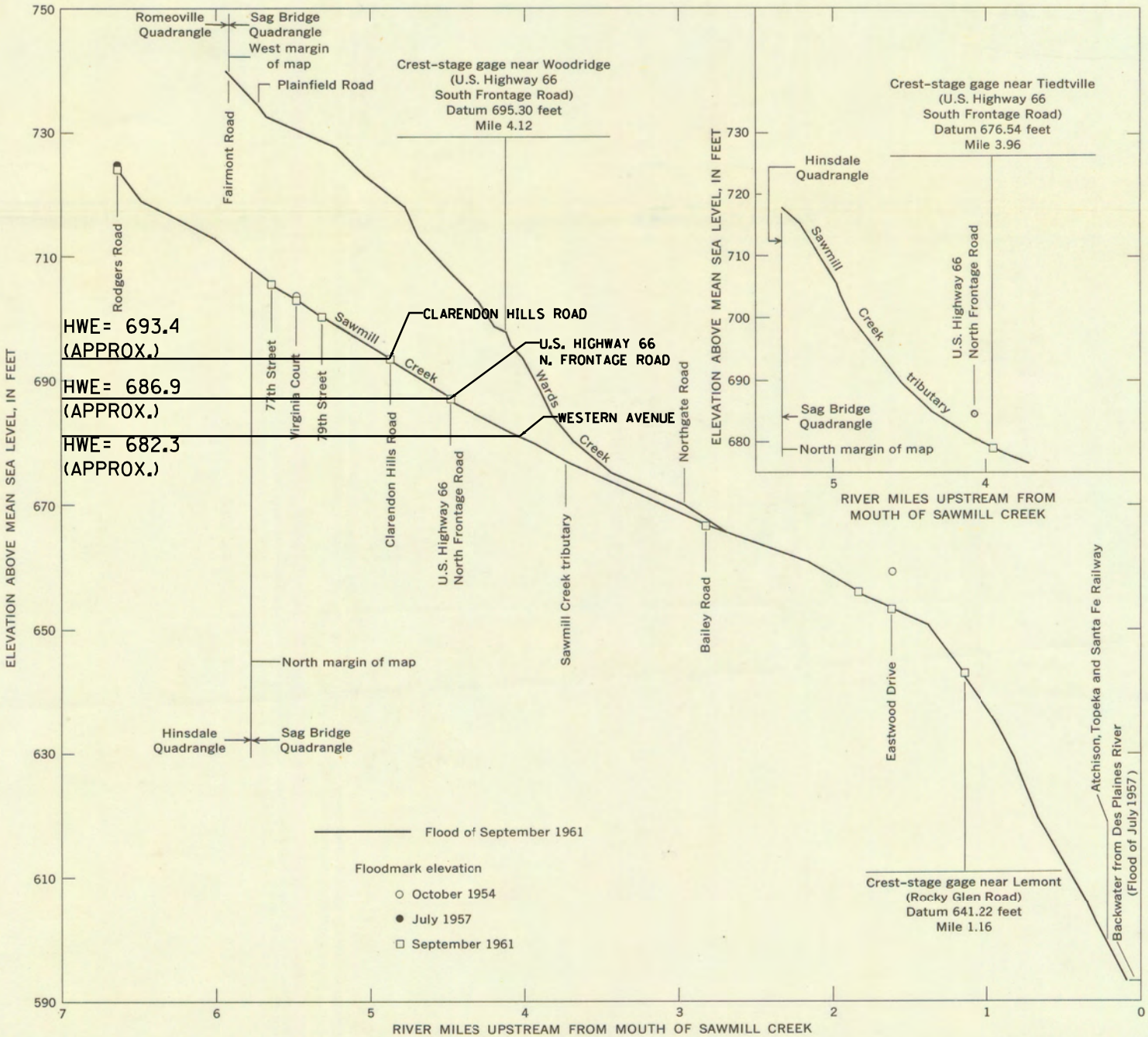


FIGURE 9.—*Profiles of floods on Sawmill Creek, Sawmill Creek tributary, and Wards Creek.*

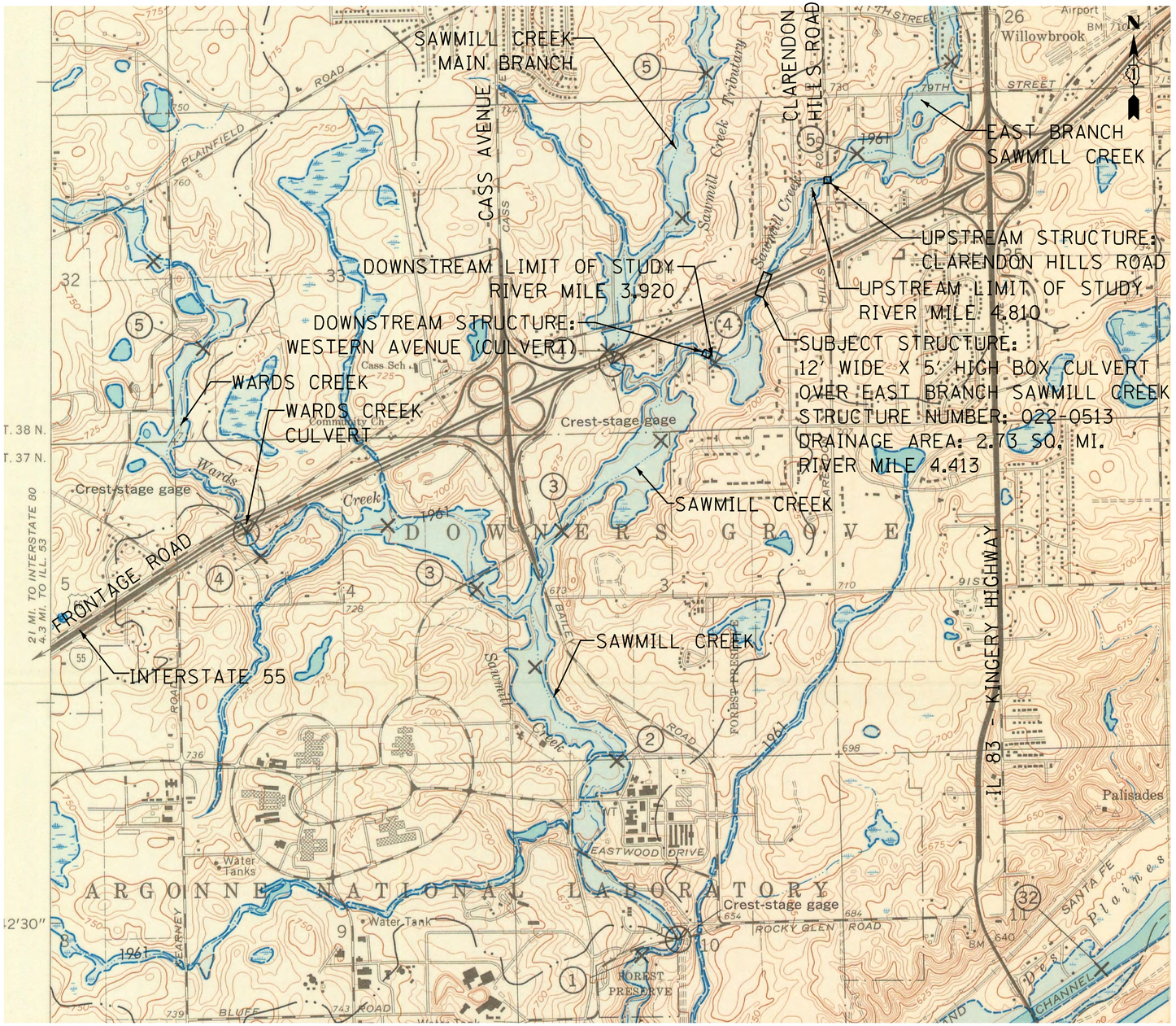
HIGH WATER ELEVATION

APPROXIMATED FROM
HYDROLOGIC ATLAS HA-149
(SAG BRIDGE QUADRANGLE)

IV. EXHIBITS

EXHIBIT A

PROJECT LOCATION MAP ON USGS HYDROLOGIC ATLAS



PROFILE OF FLOODS:

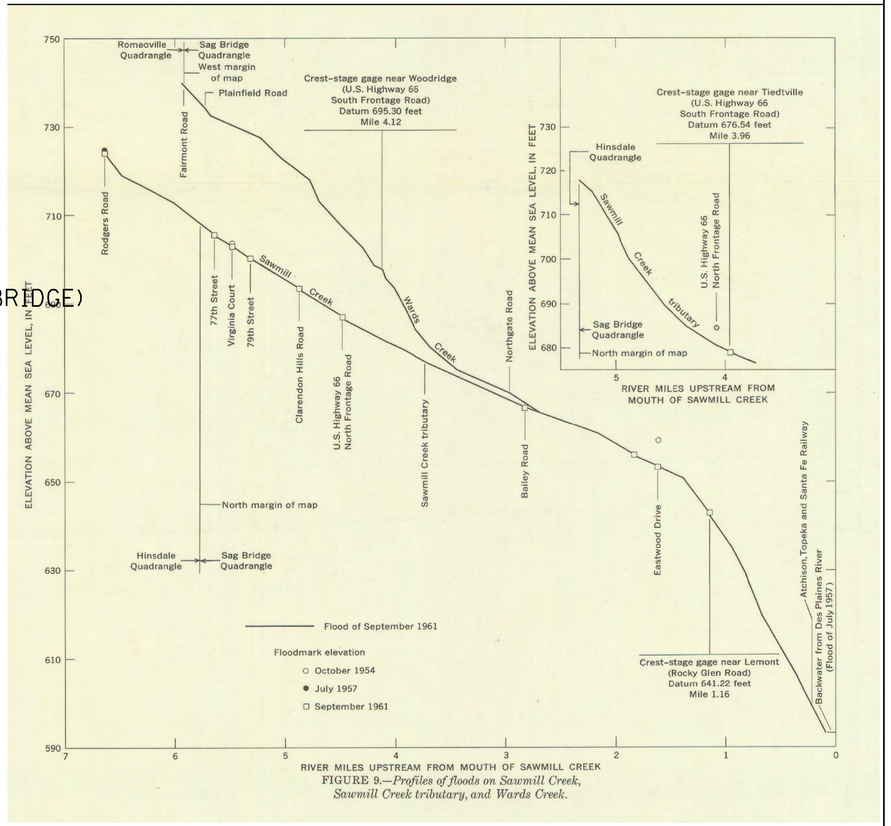


FIGURE 9.—*Profiles of floods on Sawmill Creek, Sawmill Creek tributary, and Wards Creek.*

LEGEND:

Area flooded 1954, 1957 and 1961	
Boundary of 1954 flood	1954
Boundary of 1957 flood	1957
Boundary of 1961 flood	1961
Drainage divide	
River mile measured along stream channel	13

SCALE:

1 ½ 0 1 MILE

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 5 FEET
DATUM IS MEAN SEA LEVEL

GENERAL LOCATION DRAINAGE MAP:

ROUTE: INTERSTATE 55 (STEVENSON EXPRESSWAY)
LIMITS: AT EAST BRANCH SAWMILL CREEK
BASE MAPS: HYDROLOGIC ATLAS HA-146 (ROMEOVILLE QUADRANGLE)
HYDROLOGIC ATLAS HA-149 (SAG BRIDGE QUADRANGLE)
MAP DATE: 1966

FILE NAME = V:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\DIP91[illegible]-location-ha.dgn	USER NAME = dbook	DESIGNED -	REVISED -
		DRAWN -	REVISED -
	PLOT SCALE = 1000.0000 ' / in.	CHECKED -	REVISED -
Default	PLOT DATE = 8/5/2016	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I–55 OVER EAST BRANCH SAWMILL CREEK
EXHIBIT A – LOCATION MAP

SCALE: | SHEET OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
				EX. A
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

EXHIBIT B

PHOTOGRAPHS OF THE STRUCTURE AND SURROUNDING AREA

INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK
DUPAGE COUNTY

S.N. 022-0513 – Photographs taken December 14, 2012

Photo #1 – Upstream Face of East Branch Sawmill Creek (Looking Southeast)

Photo #2 – Upstream Face of East Branch Sawmill Creek (Looking Southwest)

Exhibit B

INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK
DUPAGE COUNTY

S.N. 022-0513 – Photographs taken December 14, 2012

Photo #3 – Downstream Face of East Branch Sawmill Creek (Looking Northeast)

Photo #4 – East Branch Sawmill Creek Downstream Channel (Looking Southwest)

INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK
DUPAGE COUNTY

S.N. 022-0513 – Photographs taken December 14, 2012

Photo #5 –East Branch of Sawmill Creek Upstream Channel (Looking Northeast)

Photo #6 – North Frontage Road (Looking East)

INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK
DUPAGE COUNTY

S.N. 022-0513 – Photographs taken December 14, 2012

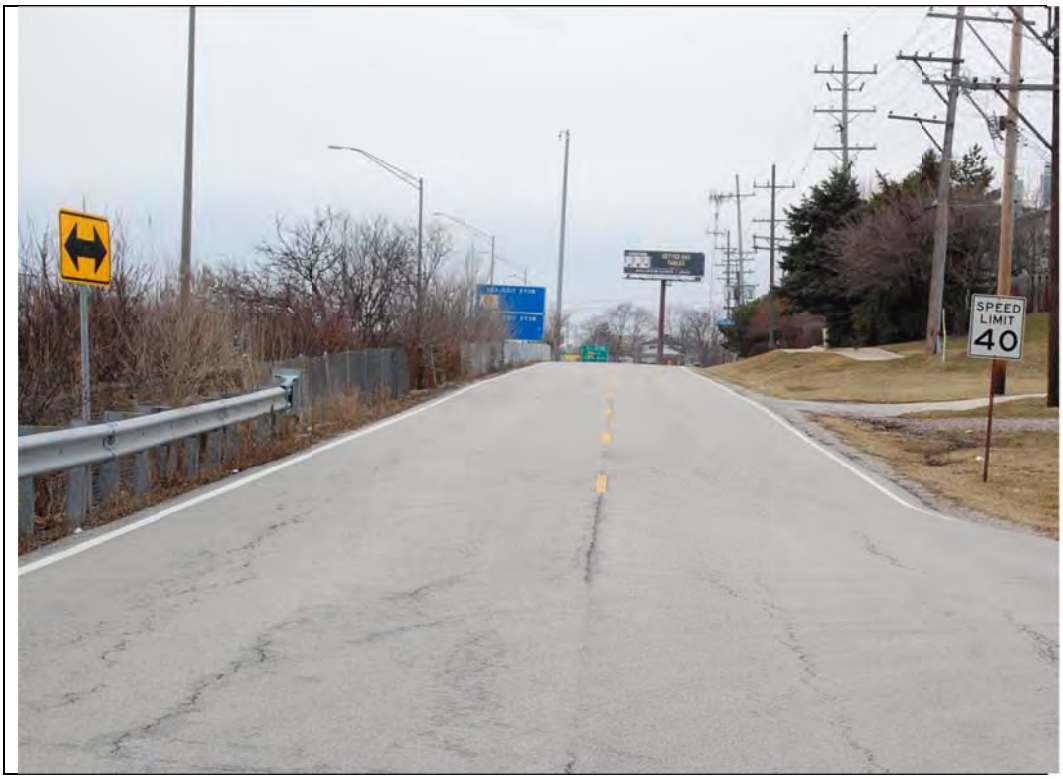


Photo #7 – North Frontage Road (Looking West)

Photo #8 – Structure Upstream of Project: Clarendon Hills Road Bridge - Upstream Face (Looking West)

Photo #9 – Structure Upstream of Project: Clarendon Hills Road Bridge - Downstream Face (Looking East)

Photo #10 – Structure Downstream of Project: Western Avenue Culvert - Upstream Face (Looking West)

Photo #11 – Structure Downstream of Project: Western Avenue Culvert - Downstream Face (Looking East)

EXHIBIT C

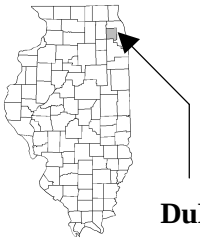
FLOOD INSURANCE STUDY (FIS) INFORMATION

FLOOD INSURANCE STUDY

A Report of Flood Hazards in

DUPAGE COUNTY, ILLINOIS

AND INCORPORATED AREAS



DuPage County

Community Name	Community Number	River Basin
Addison, Village of	170198	
Aurora, City of	170320	
Bartlett, Village of	170059	
Bensenville, Village of	170200	
Bloomingdale, Village of	170201	
Carol Stream, Village of	170202	
Clarendon Hills, Village of	170203	
Darien, City of	170750	
Downers Grove, Village of	170204	
DuPage County (Unincorporated Areas)	170197	
Elmhurst, City of	170205	
Glen Ellyn, Village of	170207	
Glendale Heights, Village of	170206	
Hinsdale, Village of	170105	
Itasca, Village of	170210	

Community Name	Community Number	River Basin
Lemont, Village of	170117	
Lisle, Village of	170211	
Lombard, Village of	170212	
Naperville, City of	170213	
Oak Brook, Village of	170214	
Oakbrook Terrace, City of	170215	
Roselle, Village of	170216	
Villa Park, Village of	170217	
Warrenville, City of	170218	
Wayne, Village of	170865	
West Chicago, City of	170219	
Westmont, Village of	170220	
Wheaton, City of	170221	
Willowbrook, Village of	170222	
Winfield, Village of	170223	
Wood Dale, City of	170224	
Woodbridge, Village of	170737	

CTP Cooperating Technical Partners

Data for Disaster Resistance

Federal Emergency Management Agency
State of Illinois

Flood Insurance Study Number
17043CV000H

TABLE 3 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
DES PLAINES RIVER					
At river mile 26.75	684	6,060	7,800	9,000	10,000
DEVON AVENUE TRIBUTARY					
At lower corporate limit for the Village of Itasca	1.20	130	200	240	320
Approximately 100 feet upstream of Pierce Road	0.80	105	165	200	270
EAST BRANCH DUPAGE RIVER					
At Mile 30.6	80.1	2,000	2,910	3,375	4,700
Just downstream of Crabtree Creek	75.3	1,850	2,630	3,080	4,270
At Hobson Road bridge	71.1	1,840	2,600	3,015	4,175
At Maple Avenue	58.3	1,810	2,510	2,900	3,880
At East-West Tollway	40.1	1,370	1,850	2,200	2,890
At Butterfield Road	27.2	1,010	1,325	1,630	2,090
At Glen Ellyn Sewage Disposal Plant	22.9	885	1,150	1,435	1,820
At St. Charles Road	14.2	610	760	990	1,220
Above confluence with Armitage Creek	6.4	280	330	350	410
EAST BRANCH SAWMILL CREEK					
At 79th Street	2.10	253	410	481	690
At 75th Street	0.99	178	290	340	480
At Elm Street	0.55	123	200	235	332
At Janet Road	0.32	89	140	170	239
At Rodger Road	0.24	75	120	140	200
At 68th Street	0.20	65	103	120	170
EAST BRANCH TRIBUTARY NO. 1					
At mouth	0.44	85	155	210	330
EAST BRANCH TRIBUTARY NO. 2					
At mouth	0.97	180	315	420	620

FLOODING SOURCE		RIVER CHANNEL				BASE FLOOD WATER SURFACE ELEVATIONS (FEET NGVD)
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	STREAM-BED ELEVATION (FT. NGVD)	
Sawmill Creek Tributary No. 1 (SWSW)						
SWSW0027	19,298	*	*	*	673.6	679.1
SWSW0028	21,965	*	*	*	682.7	689.7
SWSW0029	23,517	*	*	*	688.0	694.6

[1] In feet above confluence with Sawmill Creek

* Data not available

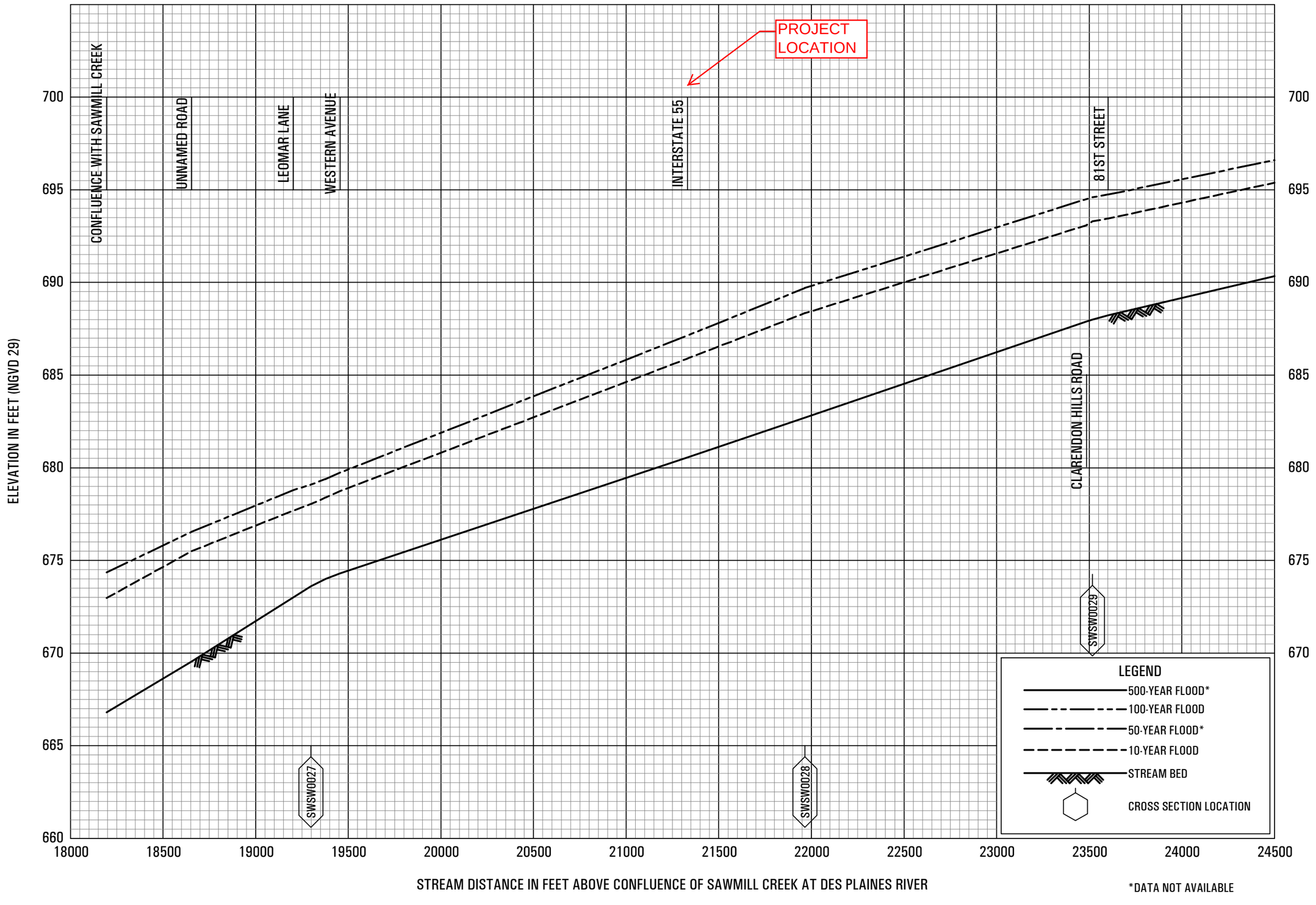
TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

DUPAGE COUNTY, IL
AND INCORPORATED AREAS

100-YEAR FLOOD DATA (SWSW)

SAWMILL CREEK TRIBUTARY NO. 1



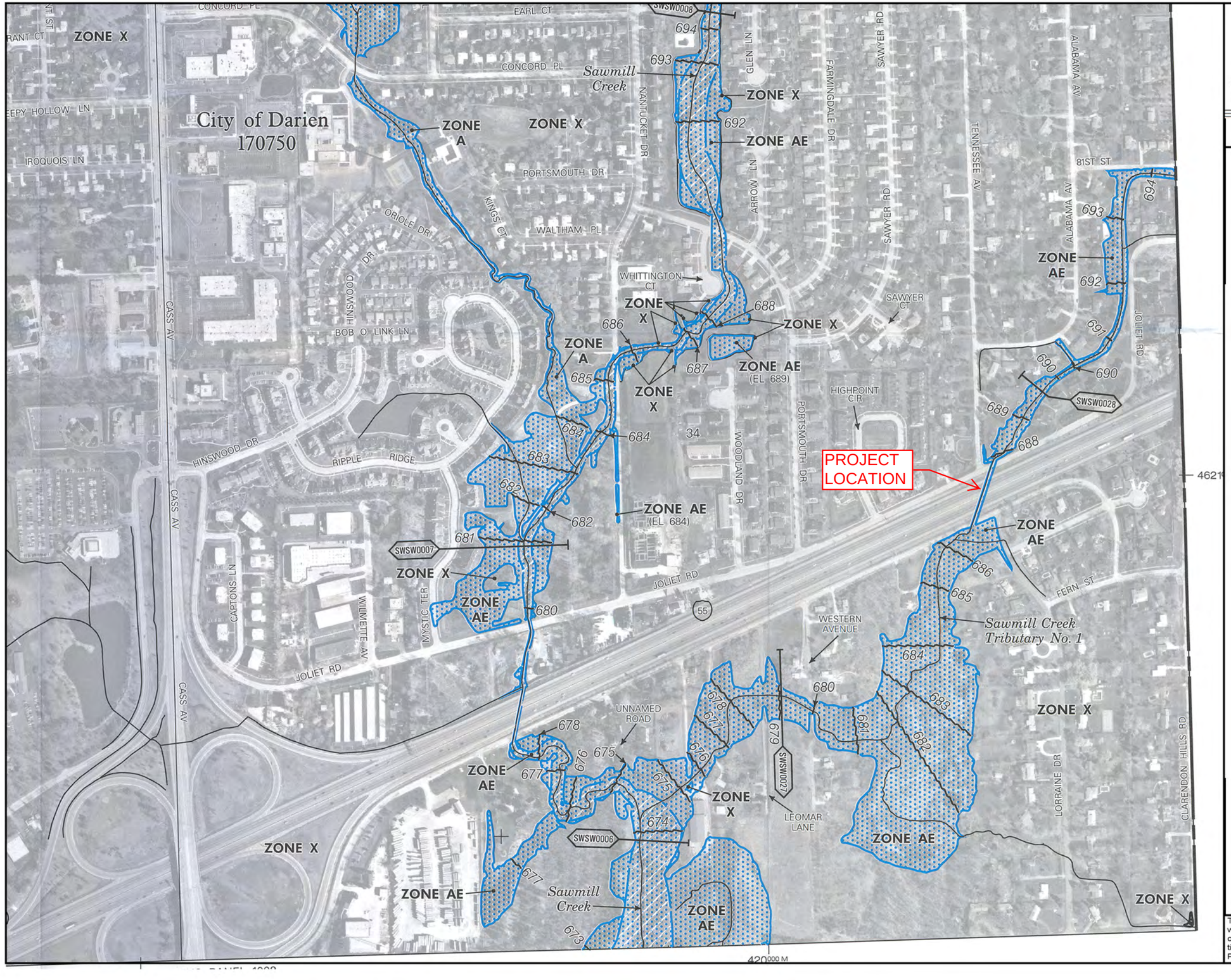
FLOOD PROFILES

SAWMILL CREEK TRIBUTARY NO. 1 (SWSW)

FEDERAL EMERGENCY MANAGEMENT AGENCY

DU PAGE COUNTY, IL

AND INCORPORATED AREAS



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METE

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0908H

FIRM

FLOOD INSURANCE RATE MAP

DuPAGE COUNTY, ILLINOIS AND INCORPORATED AREAS

PANEL 0908 OF 1006

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DARIEN, CITY OF	170750	0908	H
DOWNERS GROVE, VILLAGE OF	170204	0908	H
DuPAGE COUNTY	170197	0908	H
WILLOWBROOK, VILLAGE OF	170222	0908	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
17043C0908H

EFFECTIVE DATE
DECEMBER 16, 2004

Federal Emergency Management Agency

National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

Village of Willowbrook
170222

DuPage County
Unincorporated Areas
170197

ZONE X
ZONE AE
East Branch Sawmill Creek
Sawmill Creek Tributary No. 1
LIMIT OF FLOODWAY
SWSW0031
SWSW0030
SWSW0029
709
708
707
706
705
703
702
701
700
699
698
697
696
695
ELEANOR PL
VIRGINIA CT
MIDWAY DR
BROOKBANK RD
WILLIAM DR
LAKE DR
79TH ST
80TH ST
81ST ST
SUNSET RD
FRONTAGE RD
EXECUTIVE DR
QUINCY ST
JOLIET RD
VILLAGE OF WILLOWBROOK
VILLAGE OF BURR RIDGE
MADISON ST
SHORE CT
SHORE DR
BONNIE BRAE LN
SUNRISE AV
MEADOW CT
HIGHLAND RD
HARVEY RD
83RD ST
1850000 FT
JOINS PANEL 0908
35
55

FLOOD HAZARD INFORMATION IS SHOWN WITHIN THE VILLAGE OF BURR RIDGE FOR INFORMATION PURPOSES ONLY. FOR FLOOD INSURANCE PURPOSES, REFER TO THE SEPARATELY PRINTED FLOOD

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0909H

FIRM

FLOOD INSURANCE RATE MAP

DuPAGE COUNTY,
ILLINOIS
AND INCORPORATED AREAS

PANEL 0909 OF 1006

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DARIEN, CITY OF	170750	0909	H
DuPAGE COUNTY	170197	0909	H
WILLOWBROOK, VILLAGE OF	170222	0909	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
17043C0909H

EFFECTIVE DATE
DECEMBER 16, 2004

Federal Emergency Management Agency

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the National Geodetic Vertical Datum of 1929

DPDP0001 — DPDP0001 — Cross section line

97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

4276000 M — 1000-meter Universal Transverse Mercator grid values, zone 16

600000 FT — 5000-foot grid values; Illinois State Plane Coordinate System, East Zone (FIPSZONE 1201), Transverse Mercator Projection.

DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)

● M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 16, 2004

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0908H

FIRM

FLOOD INSURANCE RATE MAP

DuPAGE COUNTY,
ILLINOIS
AND INCORPORATED AREAS

PANEL 0908 OF 1006

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

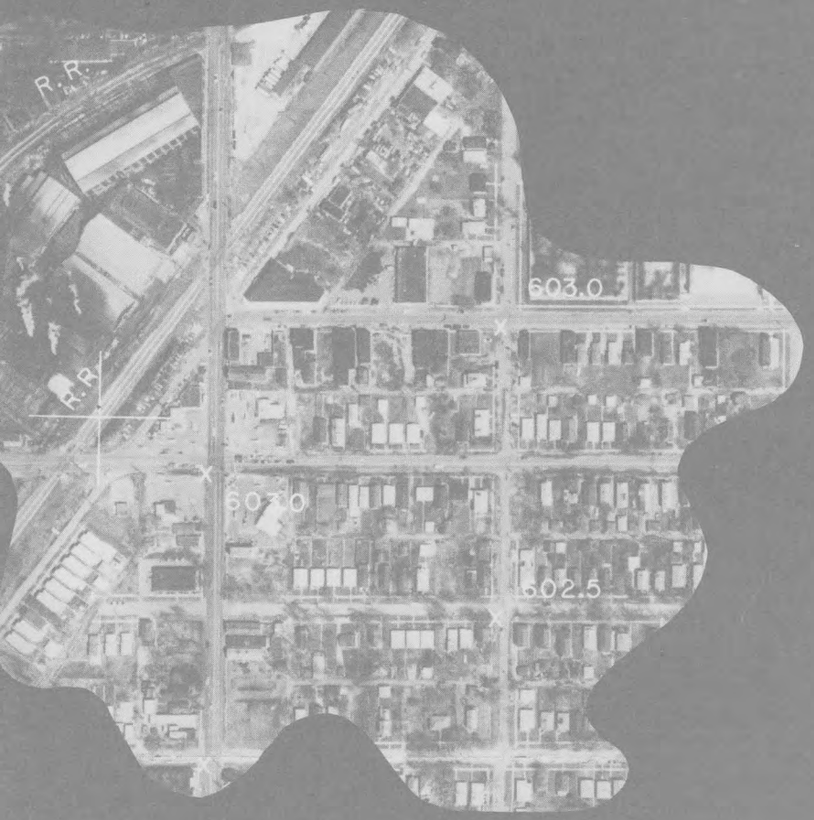
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
17043C0908H

EFFECTIVE DATE
DECEMBER 16, 2004

Federal Emergency Management Agency

Flood Plain Information Maps and Profiles



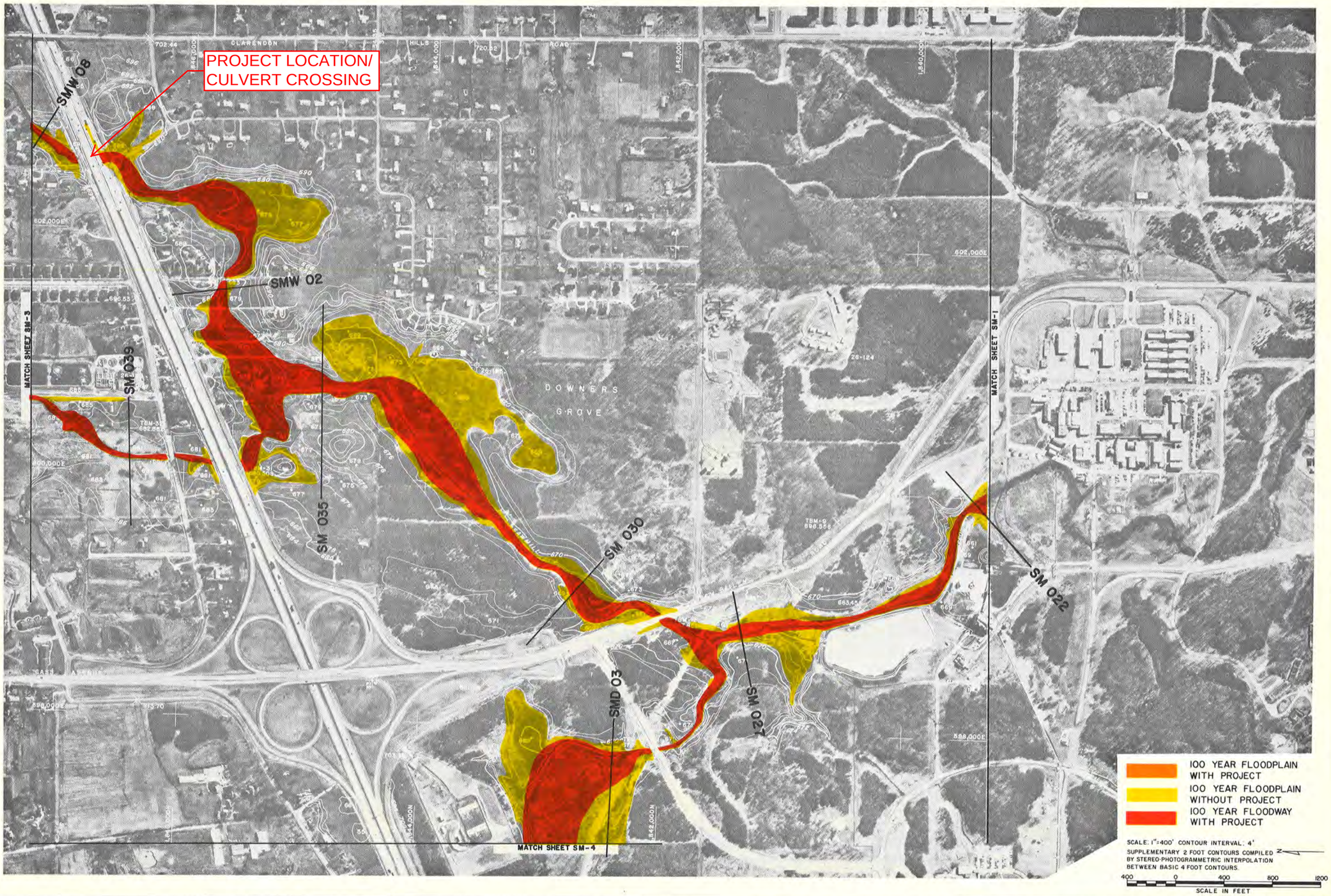
DES PLAINES RIVER

Cook and DuPage Counties, Illinois

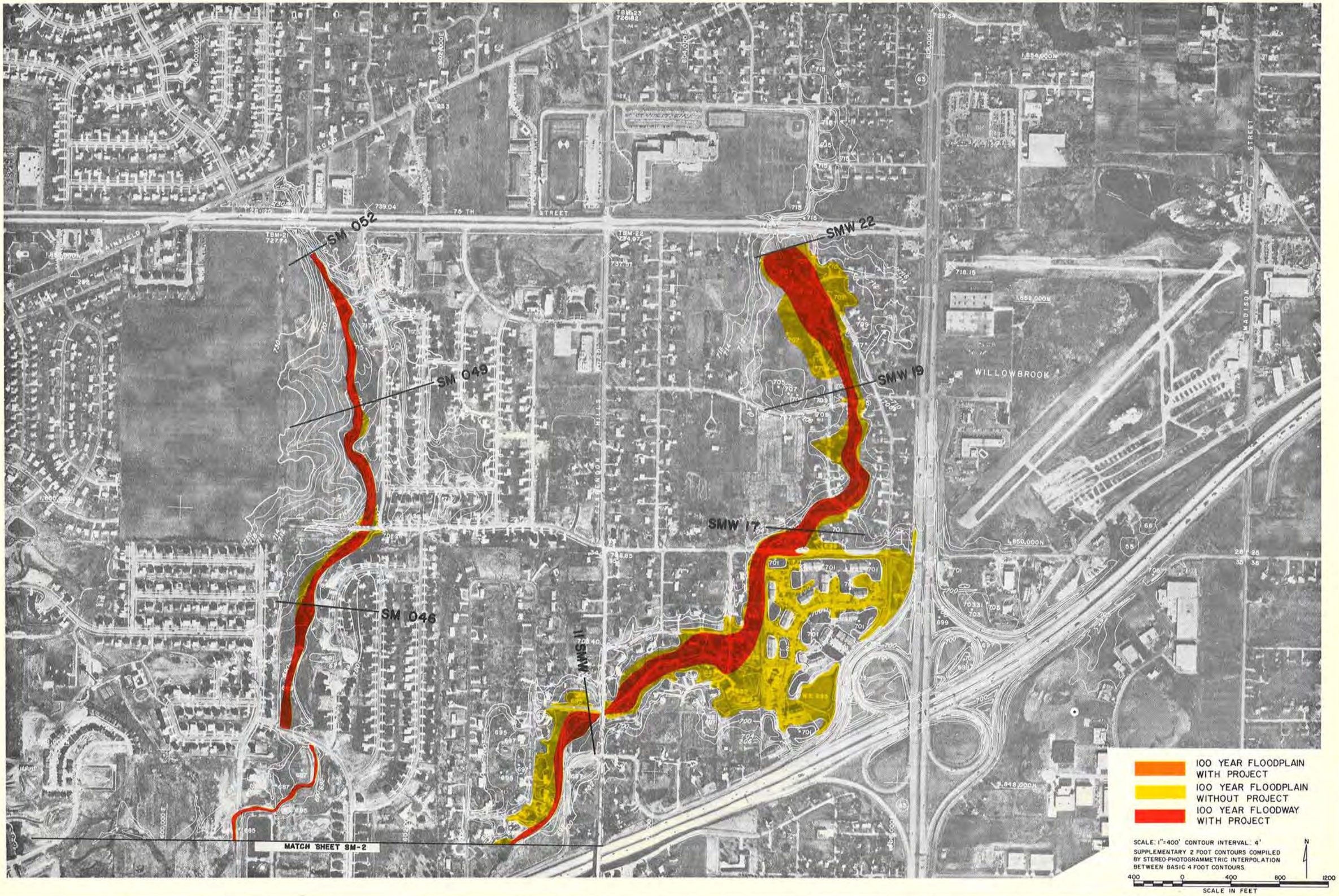
DECEMBER 1975

Prepared by:
Des Plaines River Steering Committees

With assistance by:
U.S. Department of Agriculture
Soil Conservation Service and Forest Service
Metropolitan Sanitary District of Greater Chicago
Illinois Department of Conservation



PREPARED BY ALSTER & ASSOCIATES INC. MADISON, WISCONSIN	DATE OF PHOTOGRAPHY: MARCH 7, 1974 DATE OF MAPPING: SPRING, 1974	PREPARED FOR U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE IN COOPERATION WITH METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO	FLOODPLAIN TOPOGRAPHIC MAP DES PLAINES RIVER WATERSHED DU PAGE AND COOK COUNTIES ILLINOIS	SHEET SM-2



PREPARED BY ALSTER & ASSOCIATES INC. MADISON, WISCONSIN	DATE OF PHOTOGRAPHY MARCH 7, 1974 DATE OF MAPPING SPRING 1974	PREPARED FOR U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE IN COOPERATION WITH METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO	FLOODPLAIN TOPOGRAPHIC MAP DES PLAINES RIVER WATERSHED DU PAGE AND COOK COUNTIES ILLINOIS

SHEET SM-3

SAWMILL CREEK

LOWER TRIB 1 / EAST BRANCH + SAWMILL CREEK & LOWER WARDS CREEK

LISTING FROM SCS ← i.e. FPI 1975
INPUT ONLY

~~THIS FILE PROVIDED FOR INFORMATIONAL PURPOSE - NOT VERIFIED AS FINAL FIS MODEL~~

~~SAM~~ 12/67

```
WSP2        SAWMILL CREEK FLOODWAYS WITHOUT PROJECT HCI
   SM002    591.6      2658.3
   SM003    598.1      2649.6
   SM008    623.7      2623.2
   SM016    652.0      2588.0
   019SM    657.24     2395.26
   SM022    659.7      2395.3
   SM027    665.3      2256.3
   SM030    669.2      1299.0
   SM035    673.9      1190.6
   SM039    680.9      495.3
   SM046    693.6      378.5
   SM049    709.0      313.2
   SM052    720.4      226.1
   SMW02    679.2      733.0
   SMW08    689.6      617.4
   SMW11    694.6      566.0
   SMW17    700.4      480.6
   18SMW    702.40     410.69
   SMW19    705.3      410.7
   SMW22    710.6      339.5
   SMD03    670.3      923.1
   SMD10    688.8      661.3
   13SDM    704.16     599.10
   SMD13    704.2      599.1
   SMD18    715.3      477.3
   SMD26    731.0      353.3
TITLE       DES PLAINS RIVER - SAWMILL CREEK FUTURE W/O PROJECT
TITLE       PRESENT CONDITION WITHOUT PROJECT
TRIB        SM027      SM035
DISCHARGE   -1.0       1.0        2.0        3.0        2.0        5.0
DISCHARGE   -1.0       10.0       25.0       100.0
OUTPUT      RPS
REACH       SM002      13.70      850.0      750.0      750.0
FLOW-FREQ   SM002         2658.34    1819.11    1400.15    1042.71    633.81
FLOW-FREQ   SM002      42.0       28.0       14.0
REACH       SM003      13.65      820.0      770.0      770.0
FLOW-FREQ   SM003         2649.56    1813.11    1395.52    1039.25    631.69
FLOW-FREQ   SM003      42.0       28.0       14.0
REACH       SM008      13.50      2630.0     2580.0     2580.0
FLOW-FREQ   SM008         2623.20    1795.09    1381.62    1028.86    625.33
FLOW-FREQ   SM008      42.0       28.0       14.0
REACH       SM016      13.30      3900.0     3500.0     3500.0
FLOW-FREQ   SM016         2588.00    1771.04    1363.07    1015.00    616.85
FLOW-FREQ   SM016      39.0       26.0       13.0
ROAD        019SM      2.7        1800.0     1550.0                12.55
REACH       SM022      12.21      1610.0     1600.0     1600.0
FLOW-FREQ   SM022         2395.26    1639.30    1261.47    939.08     570.41
FLOW-FREQ   SM022      36.0       24.0       12.0
REACH       SM027      11.43      2450.0     2450.0     2450.0
FLOW-FREQ   SM027         2256.34    1544.35    1188.25    884.39     536.97
FLOW-FREQ   SM027      33.0       22.0       11.0
REACH       SM030      6.21       1550.0     1500.0     1500.0
FLOW-FREQ   SM030         1298.98    889.72     683.75     507.90     307.22
FLOW-FREQ   SM030      18.0       12.0       6.0
REACH       SM035      5.64       2750.0     2750.0     2750.0
FLOW-FREQ   SM035         1190.58    815.57     626.64     465.33     281.31
FLOW-FREQ   SM035      18.0       12.0       6.0
REACH       SM039      2.14       2250.0     1950.0     1950.0
FLOW-FREQ   SM039         495.27     339.66     260.48     192.82     115.87
                          100        25         10         5          2
```

Handwritten notes beside the printout:

SM039–SM046: LOMR 92-05-081P SUPERSEDES

SM049–SM052: LOMRS 92-05-088P & 97-05-381P SUPERSEDE
—WS/ISWS 2/15/2012

13SDM–SMD26: MODEL SUBMITTED FOR LOMR 97-05-053P INCLUDES REVISED DATA
—WS/ISWS 2/15/2012

① (circled next to the first TITLE line)

THIS MODEL APPARENTLY USED FOR DUPAGE COUNTY UNINC. AREAS FIS 1982/1985 REACHES (LOWER XS OF THIS MODEL).

DARIEN / WILLOWBROOK / "DOWNERS GROVE" REACHES SUPERSEDED BY (1) LATER WSP-2 RUNS, SHOWN ON COMMUNITY ESDP MICROFICHES, AND (2) LOMRS AS NOTED.
—WS/ISWS 2/15/2012

HARZA
ENGINEERING COMPANY

```
STARTE    SM002     591.6     591.6     591.6     591.6     591.6
STARTE    SM002     591.6     591.6     591.6
COMPUTE   SM002     SM052     SM002
TITLE     SAWMILL CREEK TRIB TO WILLOWBROOK
REACH     SMW02     3.30      1100.0    1000.0    1000.0
FLOW-FREQ SMW02         732.97    502.41    385.63    285.86    172.24
FLOW-FREQ SMW02     9.0       6.0       3.0
REACH     SMW08     2.73      3250.0    2900.0    2900.0
FLOW-FREQ SMW08         617.38    423.28    324.77    240.60    144.80
FLOW-FREQ SMW08     9.0       6.0       3.0
REACH     SMW11     2.48      1450.0    1400.0    1400.0
FLOW-FREQ SMW11         565.98    388.08    297.70    220.48    132.62
FLOW-FREQ SMW11     6.0       4.0       2.0
```

HARZA
ENGINEERING COMPANY

```
REACH      SMW17      2.07      2900.0      2600.0      2600.0
FLOW-FREQ  SMW17          480.59      329.60      252.75      187.08      112.40
FLOW-FREQ  SMW17      6.0         4.0         2.0
ROAD       18SMW      2.7         500.0       400.0                   1.74
REACH      SMW19      1.74        1000.0      950.0       1350.0
FLOW-FREQ  SMW19          410.69      281.72      215.96      159.76       95.88
FLOW-FREQ  SMW19      6.0         4.0         2.0
REACH      SMW22      1.41        1250.0      1250.0      1250.0
FLOW-FREQ  SMW22          339.51      232.95      178.50      131.96       79.09
FLOW-FREQ  SMW22      3.0         2.0         1.0
SEGMENT    SMW02      1           D           -13.
NVALUE     0.075
SEGMENT    SMW02      2           C           23.
NVALUE     0.055
SEGMENT    SMW02      3           D           400.
NVALUE     0.080
SECTION    SMW02
              -400.0      690.0     -250.0      682.0     -150.0      680.0SMW02  1 4
               -13.0      677.0       -7.0      674.0        0.0      674.0SMW02  2 4
                 7.0      674.0       23.0      682.0      100.0      686.0SMW02  3 4
               300.0      684.0      380.0      686.0      400.0      690.0SMW02  4 4
ENDTABLE
SEGMENT    SMW08      1           D           -11.
NVALUE     0.075
SEGMENT    SMW08      2           C           7.
NVALUE     0.061
SEGMENT    SMW08      3           D           180.
NVALUE     0.070
SECTION    SMW08
              -240.0      696.0     -130.0      692.0      -80.0      690.0SMW08  1 5
               -20.0      688.0      -11.0      686.6       -6.0      682.6SMW08  2 5
                 0.0      682.6        6.0      682.6        7.0      686.6SMW08  3 5
                20.0      688.0       85.0      690.0      160.0      694.0SMW08  4 5
               180.0      696.0                                            SMW08  5 5
ENDTABLE
SEGMENT    SMW11      1           D           -24.
NVALUE     0.090
SEGMENT    SMW11      2           C           19.
NVALUE     0.070
SEGMENT    SMW11      3           D           300.
NVALUE     0.090
SECTION    SMW11
              -330.0      700.0     -230.0      698.0     -150.0      696.0SMW11  1 5
               -100.0     694.0      -24.0      694.1       -4.0      688.0SMW11  2 5
                 0.0      688.0        4.0      688.0       19.0      694.1SMW11  3 5
                30.0      695.0       50.0      694.0      150.0      694.0SMW11  4 5
               200.0      696.0      300.0      700.0                    SMW11  5 5
ENDTABLE
SEGMENT    SMW17      1           D           -15.
NVALUE     0.090
SEGMENT    SMW17      2           C           15.
NVALUE     0.070
SEGMENT    SMW17      3           D           350.
NVALUE     0.095
SECTION    SMW17
              -490.0      704.0     -420.0      702.0     -100.0      700.0SMW17  1 4
               -15.0      698.9       -3.0      694.9        0.0      694.9SMW17  2 4
                 3.0      694.9       15.0      698.9      200.0      700.0SMW17  3 4
               230.0      702.0      350.0      704.0                    SMW17  4 4
ENDTABLE
```

HARZA
ENGINEERING COMPANY

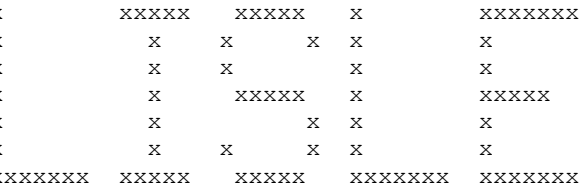
```
CULV 1     18SMW      2          11348
CULV 2     3.5                   30.0       696.8      696.4      0.025
SECTION    18SMW
           0.0        706.0      60.0       704.0      130.0      702.0
           250.0      701.5      300.0      702.0      400.0      706.0
ENDTABLE
SEGMENT    SMW19      1          D          -12.
NVALUE     0.090
SEGMENT    SMW19      2          C          12.
NVALUE     0.075
SEGMENT    SMW19      3          D          800.
NVALUE     0.090
SECTION    SMW19
              -170.0     710.0     -150.0     708.0      -90.0     706.0SMW19  1 6
               -30.0     704.0      -12.0     702.5       -4.0     700.5SMW19  2 6
                 0.0     700.5        4.0     700.5       12.0     702.5SMW19  3 6
                30.0     704.0      160.0     706.0      230.0     708.0SMW19  4 6
               370.0     708.0      420.0     706.0      700.0     706.0SMW19  5 6
               800.0     708.0                                          SMW19  6 6
ENDTABLE
SEGMENT    SMW22      1          D          -11.
NVALUE     0.088
SEGMENT    SMW22      2          C          11.
NVALUE     0.065
SEGMENT    SMW22      3          D          280.
NVALUE     .082
SECTION    SMW22
              -300.0     716.0     -260.0     714.0      -210.0    710.0SMW22  1 4
               -11.0     709.8       -4.0     707.8         0.0    707.8SMW22  2 4
                 4.0     707.8       11.0     709.3       160.0    710.0SMW22  3 4
               200.0     712.0      280.0     716.0                    SMW22  4 4
ENDTABLE
COMPUTE    SMW02      SMW22      SM035
TITLE      SAWMILL CREEK TRIB TO DOWNER GROVE (WARDS CREEK)
REACH      SMD03      5.12       1600.0     1600.0     1600.0
FLOW-FREQ  SMD03          923.06     625.30     478.84     352.88     212.89
FLOW-FREQ  SMD03      15.0       10.0       5.0
REACH      SMD10      3.52       3750.0     3600.0     3600.0
FLOW-FREQ  SMD10          661.33     449.52     344.05     253.71     152.73
FLOW-FREQ  SMD10      12.0       8.0        4.0
ROAD       13SMD      2.7        1250.0     1150.0                3.15
REACH      SMD13      3.15       108.0      350.0      350.0
FLOW-FREQ  SMD13          599.10     407.62     311.94     230.07     138.41
FLOW-FREQ  SMD13      9.0        6.0        3.0
REACH      SMD18      2.44       2700.0     2600.0     2600.0
FLOW-FREQ  SMD18          477.30     325.50     249.01     183.73     110.37
FLOW-FREQ  SMD18      6.0        4.0        2.0
REACH      SMD26      1.74       4150.0     3200.0     3200.0
FLOW-FREQ  SMD26          353.28     241.66     184.78     136.42      81.79
FLOW-FREQ  SMD26      6.0        4.0        2.0
SEGMENT    SMD03      1          D          262.0
NVALUE     0.080
SEGMENT    SMD03      2          C          290.0
NVALUE     0.055
SEGMENT    SMD03      3          D          1100.0
NVALUE     0.080
SECTION    SMD03
                 0.0     677.0      50.0     674.0      100.0     671.4SMD03  1 7
               150.0     669.4     200.0     669.2      262.0     668.7SMD03  2 7
               274.0     667.3     279.0     666.2      282.0     665.6SMD03  3 7
```

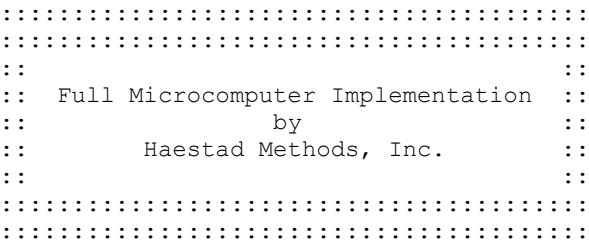
SUBMITTED MODEL FOR LOMR 97-05-053P CONTAINS MORE DATA

-WJ/SWS 2/15/2012

HARZA ENGINEERING COMPANY

```
*****************************************************************************
*                                   * (program) S/N:                        *
*                                   * HMVersion    :  2.20                  *
*               WSP-2               * Date         :  2/15/**               *
*                                   * Time         : 11:31:42               *
*      L I S L E   V E R S I O N    * Input file   : SM1975x.wsp            *
*    (Updated for FLOW-FREQ input)  * Output file  : SM1975w.txt            *
*                                   *                                        *
*                                   *                                        *
*****************************************************************************
```





37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

EXECUTION STARTED AT 11:31:42

----------80/80 LIST OF INPUT DATA----------

```
------------------------------80/80 LIST OF INPUT DATA-------------------------------
TITLE     SAWMILL CREEK TRIB TO WILLOWBROOK
REACH     SMW02          3.3      1100      1000      1000
FLOW-FREQ SMW02       732.97    502.41    385.63    285.86
REACH     SMW08         2.73      3250      2900      2900
FLOW-FREQ SMW08       617.38    423.28    324.77     240.6
REACH     SMW11         2.48      1450      1400      1400
FLOW-FREQ SMW11       565.98    388.08     297.7    220.48
REACH     SMW17         2.07      2900      2600      2600
FLOW-FREQ SMW17       480.59     329.6    252.75    187.08
ROAD      18SMW          2.7       500       400              1.74
REACH     SMW19         1.74      1000       950      1350
FLOW-FREQ SMW19       410.69    281.72    215.96    159.76
REACH     SMW22         1.41      1250      1250      1250
FLOW-FREQ SMW22       339.51    232.95     178.5    131.96
SEGMENT   SMW02            1         D       -13
NVALUE       0.075
SEGMENT   SMW02            2         C        23
NVALUE       0.055
SEGMENT   SMW02            3         D       400
NVALUE        0.08
SECTION   SMW02
              -400       690      -250       682      -150       680
               -13       677        -7       674         0       674
                 7       674        23       682       100       686
               300       684       380       686       400       690
ENDTABLE
SEGMENT   SMW08            1         D       -11
NVALUE       0.075
SEGMENT   SMW08            2         C         7
NVALUE       0.061
SEGMENT   SMW08            3         D       180
NVALUE        0.07
SECTION   SMW08
              -240       696      -130       692       -80       690
               -20       688       -11     686.6        -6     682.6
                 0     682.6         6     682.6         7     686.6
                20       688        85       690       160       694
               180       696
ENDTABLE
SEGMENT   SMW11            1         D       -24
NVALUE        0.09
SEGMENT   SMW11            2         C        19
NVALUE        0.07
SEGMENT   SMW11            3         D       300
NVALUE        0.09
```

```
------------------------------80/80 LIST OF INPUT DATA--------------------------------
SECTION   SMW11
             -330       700      -230       698      -150       696
             -100       694       -24     694.1        -4       688
                0       688         4       688        19     694.1
               30       695        50       694       150       694
              200       696       300       700
ENDTABLE
SEGMENT   SMW17            1         D        -15
NVALUE       0.09
SEGMENT   SMW17            2         C         15
NVALUE       0.07
SEGMENT   SMW17            3         D        350
NVALUE      0.095
SECTION   SMW17
             -490       704      -420       702      -100       700
              -15     698.9        -3     694.9         0     694.9
                3     694.9        15     698.9       200       700
              230       702       350       704
ENDTABLE
CULV 1    18SMW            2     11348
CULV 2        3.5                  30     696.8     696.4     0.025
SECTION   18SMW
                0       706        60       704       130       702
              250     701.5       300       702       400       706
ENDTABLE
SEGMENT   SMW19            1         D        -12
NVALUE       0.09
SEGMENT   SMW19            2         C         12
NVALUE      0.075
SEGMENT   SMW19            3         D        800
NVALUE       0.09
SECTION   SMW19
             -170       710      -150       708       -90       706
              -30       704       -12     702.5        -4     700.5
                0     700.5         4     700.5        12     702.5
               30       704       160       706       230       708
              370       708       420       706       700       706
              800       708
ENDTABLE
SEGMENT   SMW22            1         D        -11
NVALUE      0.088
SEGMENT   SMW22            2         C         11
NVALUE      0.065
SEGMENT   SMW22            3         D        280
NVALUE      0.082
```

```
------------------------------80/80 LIST OF INPUT DATA-------------------------------
SECTION   SMW22
             -300       716      -260       714      -210       710
               -11     709.8        -4     707.8         0     707.8
                 4     707.8        11     709.3       160       710
               200       712       280       716
ENDTABLE
COMPUTE   SMW02     SMW22       SM035
------------------------------END OF 80/80 LIST--------------------------------

                  COMPUTE   SMW02     SMW22       SM035

-----------------------------STARTING DATA FROM PREVIOUS COMPUTATIONS-------------------------------
```

RATING TABLE FOR SECTION SMW02 Given DA= 3.3

NO.	ELEV	AREA	CFS	ACRES FLOODED DAMAGE	ACRES FLOODED CHANNEL	ACRES FLOODED NON-DAM	FREQUENCY (YEARS)	CRIT ELEV	FRICTION SLOPE
0	674.0	0.0	0.0						
BANK FULL	677.0	60.0	240.5	.00	.00	.00			
*****WARNING-BANKFULL OR ZERO DAMAGE ELEV BELOW FIRST PROFILE. FLOW INTERPOLATED LINEARLY FROM CHANNEL BOTTOM*****									
ZERO DAMG	677.0	60.0	240.5	.00	.00	.00			
*****WARNING-BANKFULL OR ZERO DAMAGE ELEV BELOW FIRST PROFILE. FLOW INTERPOLATED LINEARLY FROM CHANNEL BOTTOM*****									
1	677.6	82.8	285.9	1.22	.00	.00	5.00	676.1	.00531
2	678.0	113.7	385.6	1.72	.00	.00	10.00	676.5	.00543
3	678.6	164.1	502.4	2.34	.00	.00	25.00	676.9	.00464
4	679.2	236.5	733.0	3.01	.00	.00	100.00	677.9	.00488

SEGMENT TABLE FOR SECTION SMW02

CSM		TOTAL	SEG NO 1	SEG NO 2	SEG NO 3
			D	C	D
1	DISCHARGE CFS	285.86	5.	281.	0.
87.	VELOCITY FPS	3.71	.68	3.74	.00
2	DISCHARGE CFS	385.63	27.	359.	0.
117.	VELOCITY FPS	3.97	1.04	4.08	.00
3	DISCHARGE CFS	502.41	75.	427.	0.
152.	VELOCITY FPS	3.85	1.25	4.10	.00
4	DISCHARGE CFS	732.97	181.	552.	0.
222.	VELOCITY FPS	4.07	1.58	4.52	.00
1	ELEV 677.6 KD	3914.	63.	3849.	1.
2	ELEV 678.0 KD	5179.	294.	4883.	1.
3	ELEV 678.6 KD	7313.	1008.	6304.	1.
4	ELEV 679.2 KD	10388.	2388.	7999.	1.

RATING TABLE FOR SECTION SMW08 Given DA= 2.7

NO.	ELEV	AREA	CFS	ACRES FLOODED DAMAGE	ACRES FLOODED CHANNEL	ACRES FLOODED NON-DAM	FREQUENCY (YEARS)	CRIT ELEV	FRICTION SLOPE
0	682.6	0.0	0.0						
BANK FULL	686.6	60.2	192.3	.00	.00	.00			
*****WARNING-BANKFULL OR ZERO DAMAGE ELEV BELOW FIRST PROFILE. FLOW INTERPOLATED LINEARLY FROM CHANNEL BOTTOM*****									
ZERO DAMG	686.6	60.2	192.3	.00	.00	.00			
*****WARNING-BANKFULL OR ZERO DAMAGE ELEV BELOW FIRST PROFILE. FLOW INTERPOLATED LINEARLY FROM CHANNEL BOTTOM*****									
1	687.6	87.2	240.6	2.41	.00	.00	5.00	684.8	.00289
2	688.3	114.6	324.8	3.75	.00	.00	10.00	685.3	.00303
3	688.8	160.0	423.3	6.19	.00	.00	25.00	685.7	.00301
4	689.6	250.4	617.4	9.39	.00	.00	100.00	686.7	.00297

SEGMENT TABLE FOR SECTION SMW08

CSM		TOTAL	SEG NO 1	SEG NO 2	SEG NO 3
			D	C	D
1	DISCHARGE CFS	240.60	3.	234.	4.
88.	VELOCITY FPS	2.97	.71	2.99	.79
2	DISCHARGE CFS	324.77	9.	303.	14.
119.	VELOCITY FPS	3.27	.83	3.37	.95
3	DISCHARGE CFS	423.28	25.	362.	36.
155.	VELOCITY FPS	3.38	.95	3.61	1.08
4	DISCHARGE CFS	617.38	74.	445.	99.
226.	VELOCITY FPS	3.41	1.20	3.89	1.33
1	ELEV 687.6 KD	4450.	37.	4356.	58.
2	ELEV 688.3 KD	5881.	142.	5512.	227.
3	ELEV 688.8 KD	7647.	412.	6630.	604.
4	ELEV 689.6 KD	11203.	1267.	8223.	1713.

RATING TABLE FOR SECTION SMW11 Given DA= 2.5

NO.	ELEV	AREA	CFS	ACRES FLOODED DAMAGE	ACRES FLOODED CHANNEL	ACRES FLOODED NON-DAM	FREQUENCY (YEARS)	CRIT ELEV	FRICTION SLOPE
0	688.0	0.0	0.0						
1	692.6	96.2	220.5	.00	.00	.00	5.00	690.2	.00313
2	693.2	120.1	297.7	.00	.00	.00	10.00	690.6	.00315
3	693.8	158.6	388.1	.00	.00	.00	25.00	691.0	.00323
ZERO DAMG	694.0	188.0	438.8	.00	.00	.00			
BANK FULL	694.1	201.3	461.7	3.49	.00	.00			
4	694.6	285.0	566.0	8.43	.00	.00	100.00	691.6	.00300

SEGMENT TABLE FOR SECTION SMW11

CSM		TOTAL	SEG NO 1	SEG NO 2	SEG NO 3
			D	C	D
1	DISCHARGE CFS	220.48	0.	220.	0.
89.	VELOCITY FPS	2.30	.00	2.29	.00
2	DISCHARGE CFS	297.70	0.	298.	0.
120.	VELOCITY FPS	2.49	.00	2.48	.00
3	DISCHARGE CFS	388.08	3.	380.	5.
156.	VELOCITY FPS	2.67	.46	2.67	.49
4	DISCHARGE CFS	565.98	28.	494.	44.
228.	VELOCITY FPS	2.72	.65	2.82	.66
1	ELEV 692.6 KD	3944.	1.	3942.	1.
2	ELEV 693.2 KD	5308.	1.	5306.	1.
3	ELEV 693.8 KD	6723.	4.	6715.	4.
4	ELEV 694.6 KD	10080.	349.	9171.	561.

EBSamwillCreekat.rep

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

****

PROJECT DATA
Project Title: EB Samwill Creek at I-55
Project File : EBSamwillCreekat.prj
Run Date and Time: 9/5/2014 11:41:53 AM

Project in English units

Project Description:
East Branch Sawmill Creek at I-55 Analysis

****

PLAN DATA

Plan Title: FIS-Base Model
Plan File : v:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\hec-ras\EBSamwillCreekat.p01

Geometry Title: FIS-Base Model
Geometry File : v:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\hec-ras\EBSamwillCreekat.g04

Flow Title   : FIS_Flow Data
Flow File   : v:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\hec-ras\EBSamwillCreekat.f01

Plan Description:
FIS Existing Conditions as provided by the current FIS.

WSP2 model provided
by ISWS. Model titled:
"SAWMILL CREEK TRIB TO WILLOWBROOK"
with revision
date 06-01-87.

Plan Summary Information:
Number of: Cross Sections = 20   Multiple Openings = 0
            Culverts   = 0   Inline Structures = 0
            Bridges   = 0   Lateral Structures = 0

Computational Information
    Water surface calculation tolerance = 0.01
    Critical depth calculation tolerance = 0.01
    Maximum number of iterations   = 20
    Maximum difference tolerance   = 0.3
    Flow tolerance factor   = 0.001

Computation Options
    Critical depth computed at all cross sections
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method: Average Conveyance
    Computational Flow Regime: Subcritical Flow

EBSamwillCreekat.rep

****

FLOW DATA

Flow Title: FIS_Flow Data
Flow File : v:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\hec-ras\EBSamwillCreekat.f01

Flow Data (cfs)

River	Reach	RS	10-YR	50-YR	100-YR	500-YR
Sawmill Creek	East Branch	4.810	297.7	475	565.98	775
Sawmill Creek	East Branch	4.536	324.77	520	617.38	860
Sawmill Creek	East Branch	3.920	385.63	615	732.97	1000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Sawmill Creek	East Branch	10-YR		Known WS = 678
Sawmill Creek	East Branch	50-YR		Known WS = 678.9
Sawmill Creek	East Branch	100-YR		Known WS = 679.2
Sawmill Creek	East Branch	500-YR		Known WS = 679.9

****

GEOMETRY DATA

Geometry Title: FIS-Base Model
Geometry File : v:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\hec-ras\EBSamwillCreekat.g04

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.810

INPUT
Description: FIS Section SMW11
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-330	700	-230	698	-150	696	-100	694	-24	694.1
-4	688	0	688	4	688	19	694.1	30	695
50	694	150	694	200	696	300	700		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-330	.09	-24	.075	19	.09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
-24 19 233.33 241.66 233.33 .1 .3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
30	300	695	F

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.76433*

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

-315	699.33	-219.19	697.21	-174.18	696.02	-142.55	695.17	-110.17	693.87
-94.65	693.27	-33.36	693.07	-21.83	692.85	-4.33	687.1	0	687.1
4.33	687.1	17	692.85	27.3	693.72	36.76	693.41	46.01	693.03
135.58	693.33	139.61	693.36	186.41	695.3	249.6	697.92	280	699.33

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-315	.088	-21.83	.073	17	.087	280	.087

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-21.83	17	233.33	241.66	233.33	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.71866*

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	698.67	-208.39	696.43	-165.34	695.22	-135.1	694.34	-104.13	693.1
-89.29	692.53	-30.68	692.06	-19.67	691.6	-4.67	686.2	0	686.2
4.67	686.2	15	691.6	24.59	692.44	33.41	692.33	42.03	692.06
125.46	692.67	129.22	692.71	172.81	694.59	231.68	697.13	260	698.67

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-300	.085	-19.67	.07	15	.083	260	.083

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-19.67	15	233.33	241.66	233.33	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.673*

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-285	698	-197.58	695.64	-156.51	694.41	-127.65	693.51	-98.1	692.32
-83.94	691.8	-28.01	691.04	-17.5	690.35	-5	685.3	0	685.3
5	685.3	13	690.35	21.89	691.16	30.06	691.25	38.04	691.09
115.35	692	118.83	692.07	159.22	693.89	213.76	696.35	240	698

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-285	.083	-17.5	.068	13	.08	240	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-17.5	13	233.33	241.66	233.33	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.62733*

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-270	697.33	-186.78	694.85	-147.67	693.61	-120.2	692.67	-92.07	691.55

```
  -78.58  691.06  -25.34  690.03  -15.33   689.1   -5.33   684.4       0   684.4
    5.33   684.4      11   689.1   19.18  689.89   26.71  690.16   34.06  690.12
  105.23  691.33  108.43  691.43  145.62  693.19  195.84  695.57     220  697.33

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************************
    -270     .08  -15.33    .066      11    .077     220    .077

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -15.33      11           233.33  241.66  233.33             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.58166*

INPUT
Description:
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
    -255  696.67 -175.97  694.07 -138.84   692.8 -112.75  691.84  -86.03  690.77
  -73.23  690.33  -22.67  689.01  -13.17  687.85   -5.67   683.5       0   683.5
    5.67   683.5       9  687.85   16.48  688.61   23.35  689.08   30.07  689.16
   95.12  690.67   98.04  690.78  132.03  692.49  177.92  694.78     200  696.67

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************************
    -255    .078  -13.17    .063       9    .073     200    .073

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -13.17       9           233.33  241.66  233.33             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.536

INPUT
Description: FIS Section SMW08
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
    -240     696    -130     692     -80     690     -20     688     -11   686.6
      -6   682.6       0   682.6       6   682.6       7   686.6      20     688
      85     690     160     694     180     696

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
    -240    .075     -11    .061       7     .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -11       7           223.08     250  223.08             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.48861*

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 -252.31  695.54 -158.84  691.94 -136.47  691.18  -96.52  689.68  -83.82   689.2
  -20.63  687.18  -11.15  685.86   -6.08  681.94       0  681.94    6.08  681.94
    8.23  686.25   22.41  687.65   46.77  688.48   93.31  689.62  146.87  691.96
```

```
  175.11  693.34  186.91  694.38  196.92  695.54

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************************
 -252.31    .075  -11.15    .061    8.23    .071  196.92    .071

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -11.15    8.23           223.08     250  223.08             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.44123*

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 -264.62  695.08 -166.43  691.12 -142.94  690.35 -100.98  688.87  -87.63  688.39
  -21.26  686.36  -11.31  685.12   -6.15  681.28       0  681.28    6.15  681.28
    9.46  685.89   24.82   687.3   51.21  688.27  101.61  689.24  159.63  691.29
  190.22  692.68     203  693.68  213.85  695.08

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************************
 -264.62    .075  -11.31     .06    9.46    .072  213.85    .072

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -11.31    9.46           223.08     250  223.08             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.39384*

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 -276.92  694.62 -174.03  690.29 -149.41  689.53 -105.44  688.06  -91.45  687.59
  -21.89  685.54  -11.46  684.38   -6.23  680.62       0  680.62    6.23  680.62
   10.69  685.54   27.23  686.96   55.64  688.07  109.92  688.86  172.39  690.63
  205.33  692.02  219.09  692.99  230.77  694.62

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************************
 -276.92    .075  -11.46     .06   10.69    .072  230.77    .072

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -11.46   10.69           223.08     250  223.08             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.34646*

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 -289.23  694.15 -181.63  689.46 -155.88   688.7 -109.89  687.26  -95.26  686.79
  -22.53  684.72  -11.62  683.65   -6.31  679.95       0  679.95    6.31  679.95
   11.92  685.18   29.64  686.61   60.08  687.86  118.22  688.48  185.15  689.97
  220.44  691.36  235.18  692.29  247.69  694.15
```

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-289.23	.075	-11.62	.059	11.92	.073	247.69	.073

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-11.62	11.92	223.08	250	223.08	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.29907*

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-301.54	693.69	-189.22	688.63	-162.35	687.88	-114.35	686.45	-99.08	685.98
-23.16	683.9	-11.77	682.91	-6.38	679.29	0	679.29	6.38	679.29
13.15	684.83	32.05	686.26	64.51	687.65	126.53	688.1	197.91	689.3
235.54	690.7	251.28	691.59	264.62	693.69				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-301.54	.075	-11.77	.059	13.15	.074	264.62	.074

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-11.77	13.15	223.08	250	223.08	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.25169*

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-313.85	693.23	-196.82	687.8	-168.82	687.05	-118.81	685.64	-102.9	685.18
-23.79	683.08	-11.92	682.17	-6.46	678.63	0	678.63	6.46	678.63
14.38	684.48	34.46	685.91	68.95	687.45	134.84	687.72	210.68	688.64
250.65	690.04	267.37	690.89	281.54	693.23				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-313.85	.075	-11.92	.058	14.38	.075	281.54	.075

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-11.92	14.38	223.08	250	223.08	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.20430*

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-326.15	692.77	-204.42	686.97	-175.29	686.23	-123.26	684.84	-106.71	684.37
-24.42	682.26	-12.08	681.43	-6.54	677.97	0	677.97	6.54	677.97
15.62	684.12	36.87	685.56	73.39	687.24	143.14	687.35	223.44	687.98
265.76	689.37	283.46	690.19	298.46	692.77				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-326.15	.075	-12.08	.058	15.62	.075	298.46	.075

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-12.08	15.62	223.08	250	223.08	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.15692*

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-338.46	692.31	-212.02	686.14	-181.76	685.4	-127.72	684.03	-110.53	683.57
-25.05	681.44	-12.23	680.69	-6.62	677.31	0	677.31	6.62	677.31
16.85	683.77	39.28	685.21	77.82	687.03	151.45	686.97	236.2	687.32
280.87	688.71	299.55	689.49	315.38	692.31				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-338.46	.075	-12.23	.057	16.85	.076	315.38	.076

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-12.23	16.85	223.08	250	223.08	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.10953*

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-350.77	691.85	-219.61	685.31	-188.23	684.58	-132.17	683.23	-114.34	682.77
-25.68	680.62	-12.38	679.95	-6.69	676.65	0	676.65	6.69	676.65
18.08	683.42	41.69	684.86	82.26	686.83	159.75	686.59	248.96	686.65
295.98	688.05	315.64	688.79	332.31	691.85				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-350.77	.075	-12.38	.057	18.08	.077	332.31	.077

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-12.38	18.08	223.08	250	223.08	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.06215*

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-363.08	691.38	-227.21	684.49	-194.7	683.76	-136.63	682.42	-118.16	681.96
-26.32	679.79	-12.54	679.22	-6.77	675.98	0	675.98	6.77	675.98
19.31	683.06	44.1	684.52	86.69	686.62	168.06	686.21	261.72	685.99
311.09	687.39	331.73	688.1	349.23	691.38				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-363.08	.075	-12.54	.056	19.31	.078	349.23	.078

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-12.54	19.31	223.08	250	223.08	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.01476*

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-375.38	690.92	-234.81	683.66	-201.17	682.93	-141.09	681.61	-121.98	681.16
-26.95	678.97	-12.69	678.48	-6.85	675.32	0	675.32	6.85	675.32
20.54	682.71	46.51	684.17	91.13	686.41	176.37	685.83	274.48	685.33
326.2	686.73	347.82	687.4	366.15	690.92				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-375.38	.075	-12.69	.056	20.54	.078	366.15	.078

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-12.69	20.54	223.08	250	223.08	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 3.96738*

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-387.69	690.46	-242.4	682.83	-207.64	682.11	-145.54	680.81	-125.79	680.36
-27.58	678.15	-12.85	677.74	-6.92	674.66	0	674.66	6.92	674.66
21.77	682.35	48.92	683.82	95.56	686.21	184.67	685.45	287.24	684.66
341.31	686.07	363.91	686.7	383.08	690.46				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-387.69	.075	-12.85	.055	21.77	.079	383.08	.079

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-12.85	21.77	223.08	250	223.08	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 3.920

INPUT
Description: FIS Section SMW02
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-400	690	-250	682	-150	680	-13	677	-7	674
0	674	7	674	23	682	100	686	300	684
380	686	400	690						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

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-400 .075 -13 .055 23 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
-13 23 0 0 0 .1 .3

****

SUMMARY OF MANNING'S N VALUES

River:Sawmill Creek

Reach	River Sta.	n1	n2	n3	n4
East Branch	4.810	.09	.075	.09	
East Branch	4.76433*	.088	.073	.087	.087
East Branch	4.71866*	.085	.07	.083	.083
East Branch	4.673*	.083	.068	.08	.08
East Branch	4.62733*	.08	.066	.077	.077
East Branch	4.58166*	.078	.063	.073	.073
East Branch	4.536	.075	.061	.07	
East Branch	4.48861*	.075	.061	.071	.071
East Branch	4.44123*	.075	.06	.072	.072
East Branch	4.39384*	.075	.06	.072	.072
East Branch	4.34646*	.075	.059	.073	.073
East Branch	4.29907*	.075	.059	.074	.074
East Branch	4.25169*	.075	.058	.075	.075
East Branch	4.20430*	.075	.058	.075	.075
East Branch	4.15692*	.075	.057	.076	.076
East Branch	4.10953*	.075	.057	.077	.077
East Branch	4.06215*	.075	.056	.078	.078
East Branch	4.01476*	.075	.056	.078	.078
East Branch	3.96738*	.075	.055	.079	.079
East Branch	3.920	.075	.055	.08	

****

SUMMARY OF REACH LENGTHS

River: Sawmill Creek

Reach	River Sta.	Left	Channel	Right
East Branch	4.810	233.33	241.66	233.33
East Branch	4.76433*	233.33	241.66	233.33
East Branch	4.71866*	233.33	241.66	233.33
East Branch	4.673*	233.33	241.66	233.33
East Branch	4.62733*	233.33	241.66	233.33
East Branch	4.58166*	233.33	241.66	233.33
East Branch	4.536	223.08	250	223.08
East Branch	4.48861*	223.08	250	223.08
East Branch	4.44123*	223.08	250	223.08
East Branch	4.39384*	223.08	250	223.08
East Branch	4.34646*	223.08	250	223.08
East Branch	4.29907*	223.08	250	223.08
East Branch	4.25169*	223.08	250	223.08
East Branch	4.20430*	223.08	250	223.08
East Branch	4.15692*	223.08	250	223.08
East Branch	4.10953*	223.08	250	223.08
East Branch	4.06215*	223.08	250	223.08
East Branch	4.01476*	223.08	250	223.08
East Branch	3.96738*	223.08	250	223.08
East Branch	3.920	0	0	0

****

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Sawmill Creek

Reach	River Sta.	Contr.	Expan.

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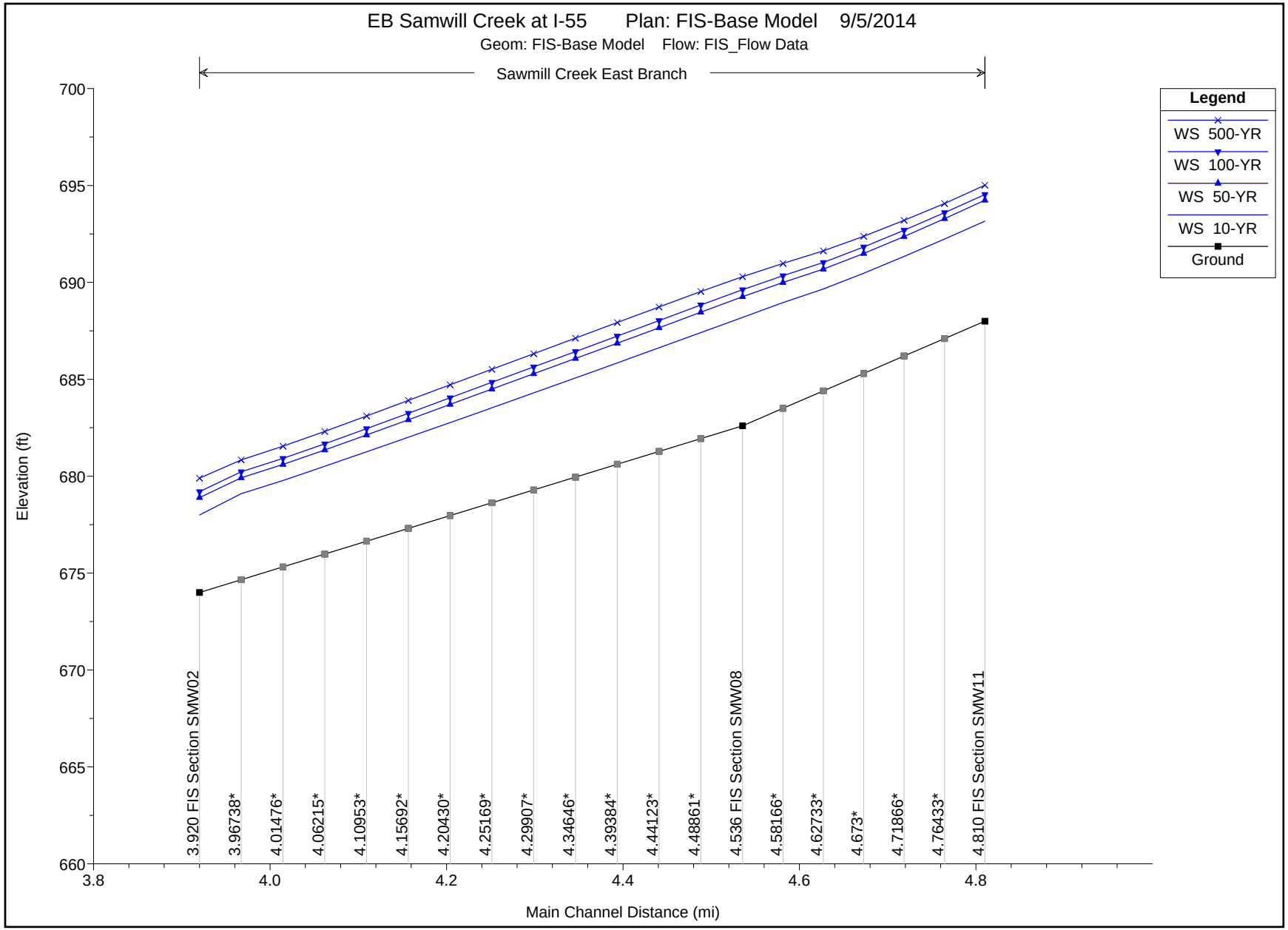
```
*East Branch     *    4.810   *       .1*       .3*
*East Branch     *    4.76433**       .1*       .3*
*East Branch     *    4.71866**       .1*       .3*
*East Branch     *    4.673*  *       .1*       .3*
*East Branch     *    4.62733**       .1*       .3*
*East Branch     *    4.58166**       .1*       .3*
*East Branch     *    4.536   *       .1*       .3*
*East Branch     *    4.48861**       .1*       .3*
*East Branch     *    4.44123**       .1*       .3*
*East Branch     *    4.39384**       .1*       .3*
*East Branch     *    4.34646**       .1*       .3*
*East Branch     *    4.29907**       .1*       .3*
*East Branch     *    4.25169**       .1*       .3*
*East Branch     *    4.20430**       .1*       .3*
*East Branch     *    4.15692**       .1*       .3*
*East Branch     *    4.10953**       .1*       .3*
*East Branch     *    4.06215**       .1*       .3*
*East Branch     *    4.01476**       .1*       .3*
*East Branch     *    3.96738**       .1*       .3*
*East Branch     *    3.920   *       .1*       .3*
*************************************************
```


EB Samwill Creek at I-55 Plan: FIS-Base Model 9/5/2014
Geom: FIS-Base Model Flow: FIS_Flow Data
Sawmill Creek East Branch
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Elevation (ft)
700
695
690
685
680
675
670
665
660
3.8
4.0
4.2
4.4
4.6
4.8
Main Channel Distance (mi)
3.920 FIS Section SMW02
3.96738*
4.01476*
4.06215*
4.10953*
4.15692*
4.20430*
4.25169*
4.29907*
4.34646*
4.39384*
4.44123*
4.48861*
4.536 FIS Section SMW08
4.58166*
4.62733*
4.673*
4.71866*
4.76433*
4.810 FIS Section SMW11

HEC-RAS Plan: 01 River: Sawmill Creek Reach: East Branch

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
East Branch	4.810	10-YR	297.70	688.00	693.16	690.58	693.26	0.003788	2.53	117.68	37.61	0.25
East Branch	4.810	50-YR	475.00	688.00	694.24	691.29	694.37	0.003919	2.91	177.23	237.76	0.26
East Branch	4.810	100-YR	565.98	688.00	694.53	691.60	694.67	0.004060	3.11	215.33	261.45	0.27
East Branch	4.810	500-YR	775.00	688.00	695.02	692.21	695.13	0.003332	3.03	411.32	300.82	0.25
East Branch	4.536	10-YR	324.77	682.60	688.21	685.26	688.38	0.003221	3.45	110.13	52.83	0.27
East Branch	4.536	50-YR	520.00	682.60	689.26	686.17	689.46	0.003131	3.87	201.12	119.02	0.28
East Branch	4.536	100-YR	617.38	682.60	689.63	686.56	689.81	0.003070	3.99	248.22	141.61	0.28
East Branch	4.536	500-YR	860.00	682.60	690.29	687.77	690.48	0.002981	4.20	356.10	177.89	0.28
East Branch	3.920	10-YR	385.63	674.00	678.00	676.52	678.26	0.005713	4.18	109.83	73.67	0.42
East Branch	3.920	50-YR	615.00	674.00	678.90	677.43	679.16	0.004987	4.46	195.44	116.57	0.40
East Branch	3.920	100-YR	732.97	674.00	679.20	677.91	679.47	0.005039	4.65	232.55	130.87	0.41
East Branch	3.920	500-YR	1000.00	674.00	679.90	678.58	680.15	0.004412	4.70	335.84	164.23	0.39

HEC-RAS Plan: 01 River: Sawmill Creek Reach: East Branch

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
East Branch	4.810	10-YR	693.26	693.16	0.10	0.91	0.00		297.70		37.61
East Branch	4.810	50-YR	694.37	694.24	0.13	0.94	0.00	5.22	469.76	0.02	237.76
East Branch	4.810	100-YR	694.67	694.53	0.14	0.94	0.00	24.74	540.81	0.43	261.45
East Branch	4.810	500-YR	695.13	695.02	0.11	0.97	0.01	73.93	591.59	109.49	300.82
East Branch	4.536	10-YR	688.38	688.21	0.18	0.80	0.00	6.83	306.91	11.03	52.83
East Branch	4.536	50-YR	689.46	689.26	0.19	0.78	0.00	42.57	418.28	59.15	119.02
East Branch	4.536	100-YR	689.81	689.63	0.19	0.77	0.00	68.52	456.59	92.27	141.61
East Branch	4.536	500-YR	690.48	690.29	0.18	0.74	0.00	141.85	531.57	186.58	177.89
East Branch	3.920	10-YR	678.26	678.00	0.26			21.54	364.09		73.67
East Branch	3.920	50-YR	679.16	678.90	0.26			111.44	503.56		116.57
East Branch	3.920	100-YR	679.47	679.20	0.27			165.60	567.37		130.87
East Branch	3.920	500-YR	680.15	679.90	0.25			323.70	676.30		164.23

Errors Warnings and Notes for Plan : 01

Location:	River: Sawmill Creek Reach: East Branch RS: 4.810 Profile: 10-YR
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Errors Warnings and Notes for Plan : 01

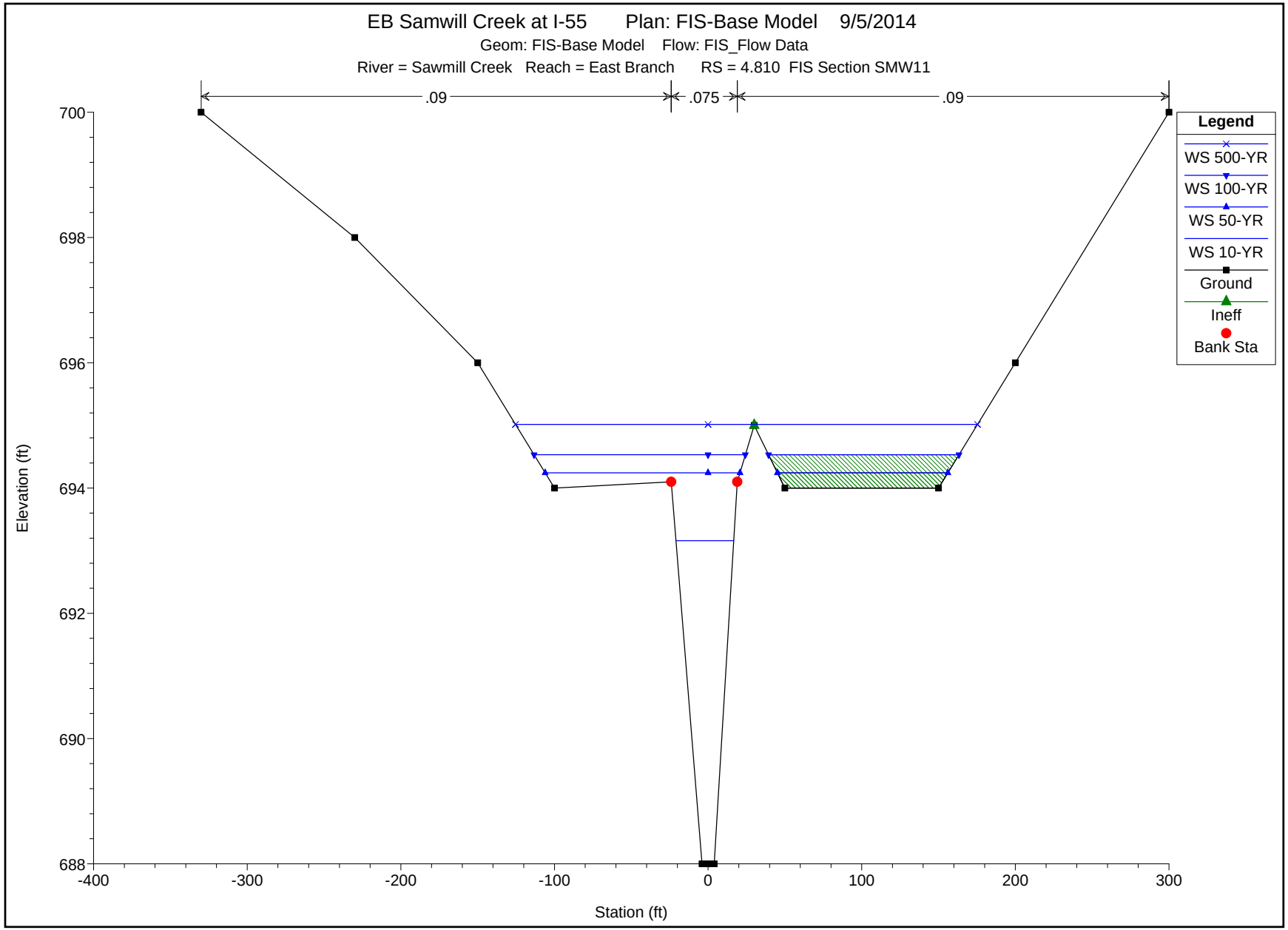
Location:	River: Sawmill Creek Reach: East Branch RS: 4.810 Profile: 50-YR
Warning:	Divided flow computed for this cross-section.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.76433* Profile: 50-YR
Warning:	Divided flow computed for this cross-section.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.71866* Profile: 50-YR
Warning:	Divided flow computed for this cross-section.

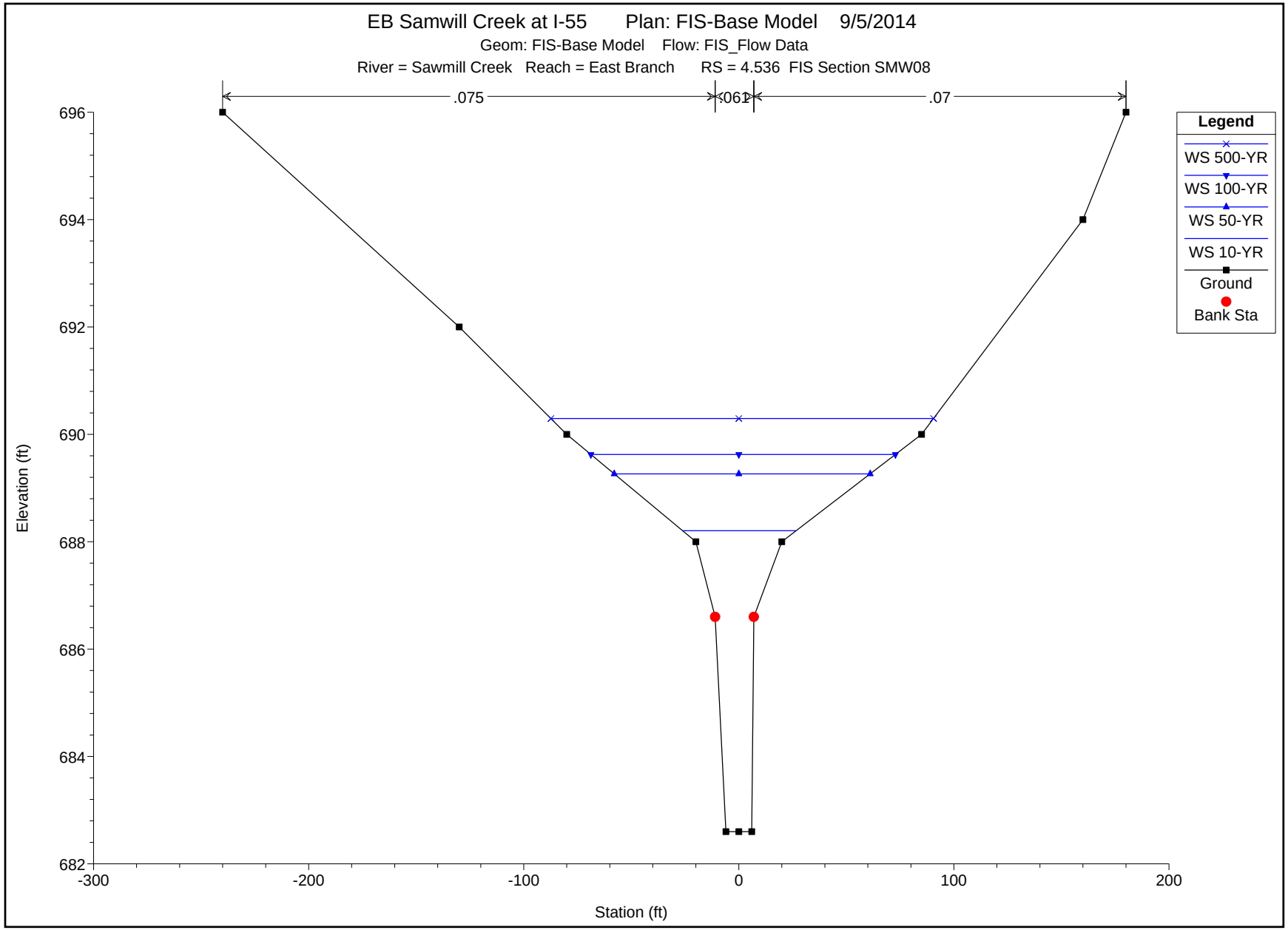
Errors Warnings and Notes for Plan : 01

Location:	River: Sawmill Creek Reach: East Branch RS: 4.810 Profile: 100-YR
Warning:	Divided flow computed for this cross-section.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.76433* Profile: 100-YR
Warning:	Divided flow computed for this cross-section.

Errors Warnings and Notes for Plan : 01

Location:	River: Sawmill Creek Reach: East Branch RS: 4.810 Profile: 500-YR
Warning:	The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had
	the least amount of error between computed and assumed values.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.


EB Samwill Creek at I-55 Plan: FIS-Base Model 9/5/2014
Geom: FIS-Base Model Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.810 FIS Section SMW11
.09
.075
.09
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Ineff
Bank Sta
Elevation (ft)
700
698
696
694
692
690
688
-400
-300
-200
-100
0
100
200
300
Station (ft)


EB Samwill Creek at I-55 Plan: FIS-Base Model 9/5/2014
Geom: FIS-Base Model Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.536 FIS Section SMW08
.075
.061
.07
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta
Elevation (ft)
696
694
692
690
688
686
684
682
-300
-200
-100
0
100
200
Station (ft)

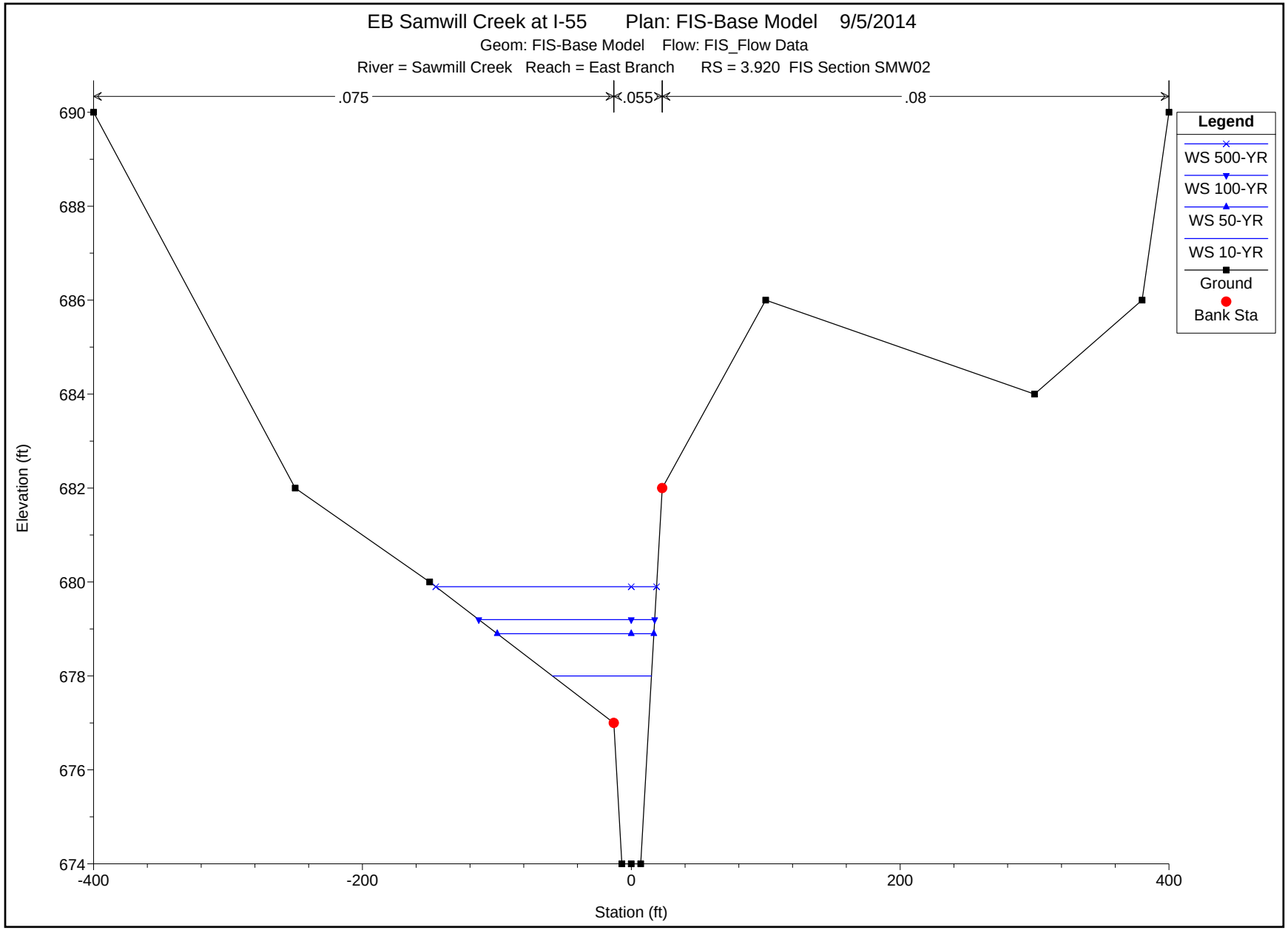
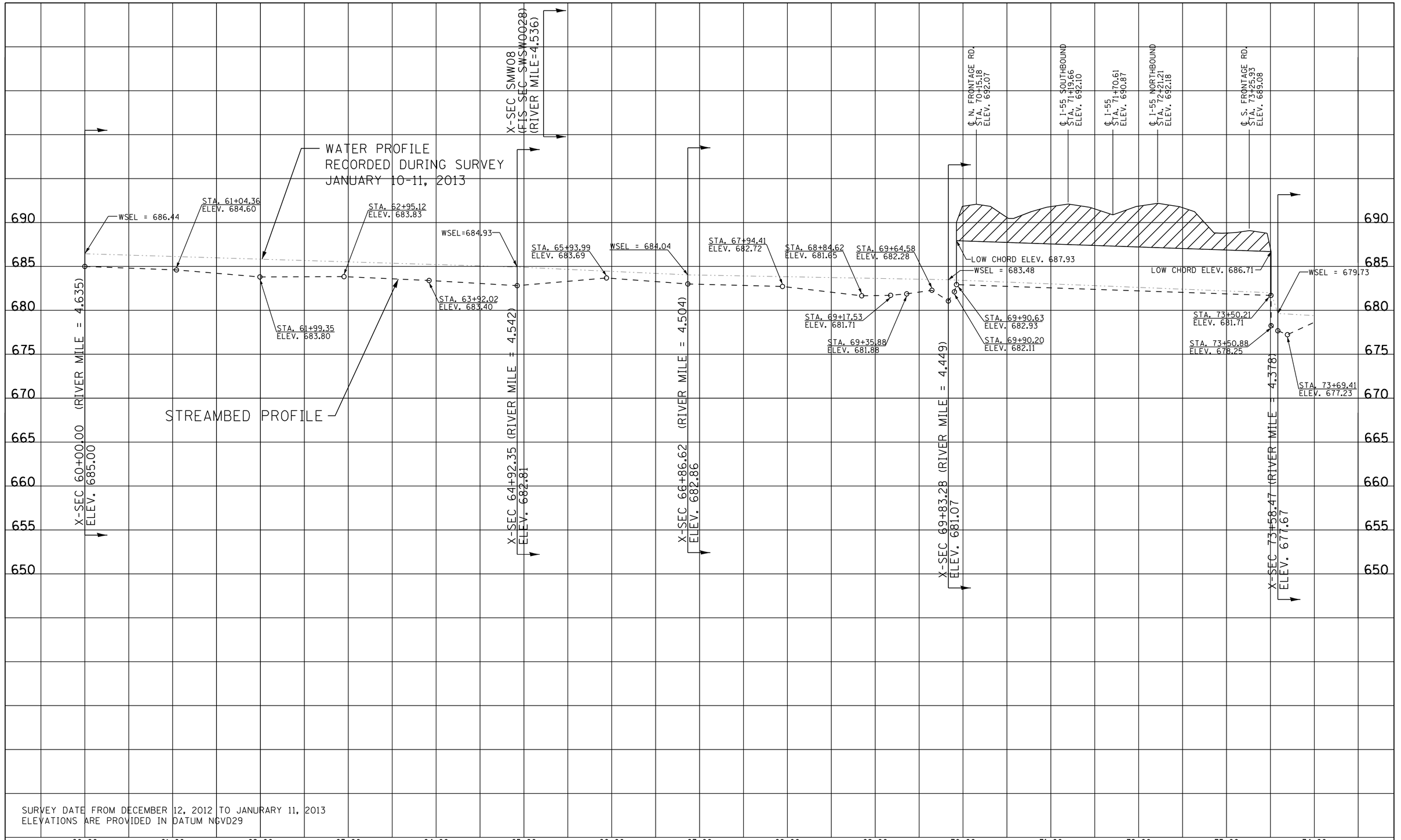

EB Samwill Creek at I-55 Plan: FIS-Base Model 9/5/2014
Geom: FIS-Base Model Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 3.920 FIS Section SMW02
.075
.055
.08
690
688
686
684
682
680
678
676
674
Elevation (ft)
-400
-200
0
200
400
Station (ft)
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta

EXHIBIT D

STREAMBED PROFILE



SURVEY DATE FROM DECEMBER 12, 2012 TO JANURARY 11, 2013
ELEVATIONS ARE PROVIDED IN DATUM NGVD29

VERTICAL SCALE: 1" = 10'
HORIZONTAL SCALE: 1" = 100' (0.0189 MILE)

PLAN: SURVEYED, PLOTTED, ABOVE CHECKED, RT. OF WAY CHECKED, CADD FILE NAME, NOTE BOOK, NO.; BY, DATE

PROFILE: SURVEYED, PLOTTED, ABOVE CHECKED, BKM. NOTED, STRUCTURE NOTATNS CHKD, NOTE BOOK, NO.; BY, DATE

FILE NAME = V:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\D1P91762 Prof.dgn	USER NAME = dbook	DESIGNED -	REVISED -
		DRAWN -	REVISED -
	PLOT SCALE = 50.0000 ' / in.	CHECKED -	REVISED -
Default	PLOT DATE = 9/24/2014	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK
EXHIBIT D – STREAMBED PROFILE

SCALE: | SHEET OF SHEETS | STA. | TO STA.

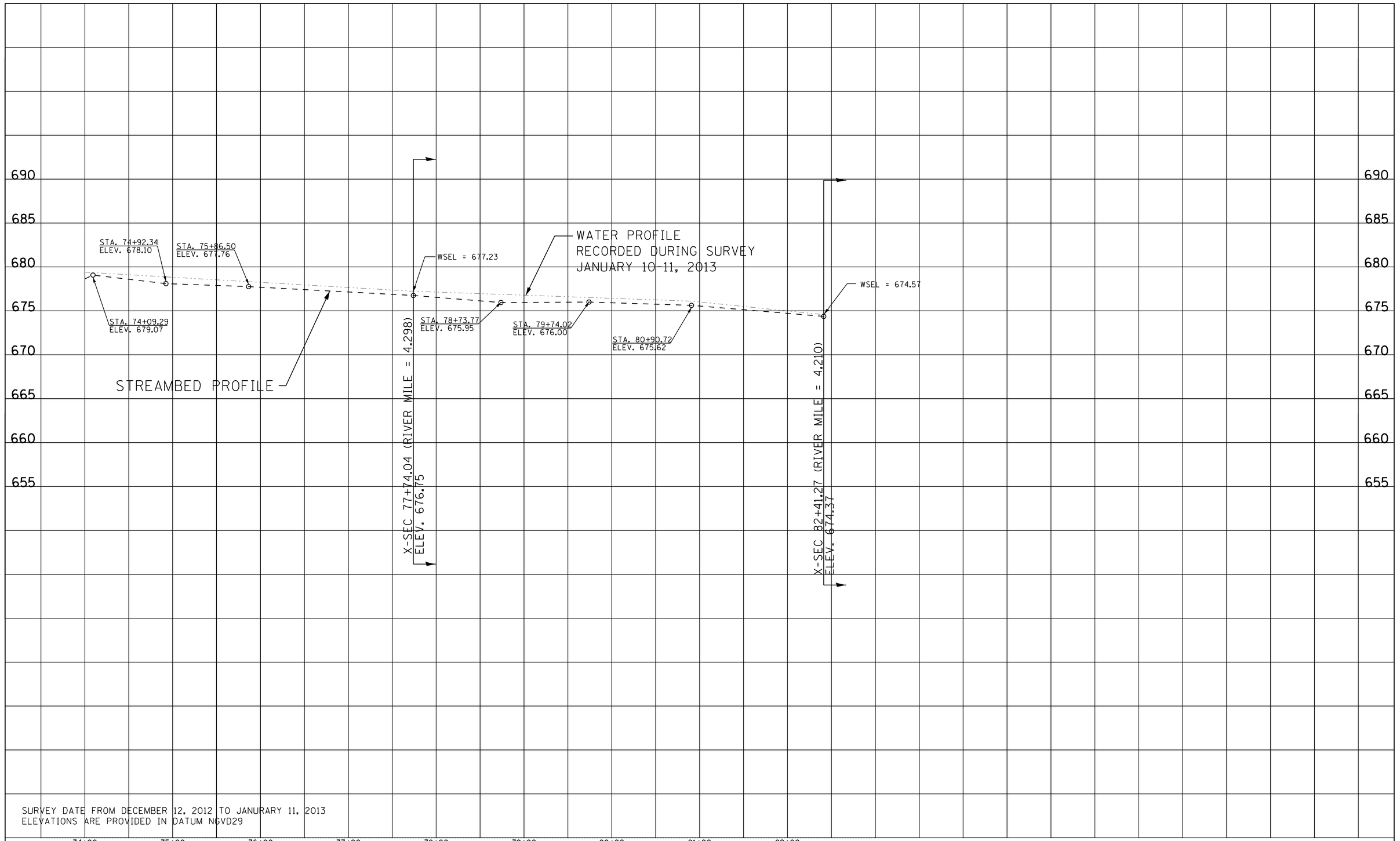
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			2	D-1

CONTRACT NO.

ILLINOIS FED. AID PROJECT

PLAN
SURVEYED
PLOTTED
CROSS CHECKED
NOTE BOOK
NO.
BY
DATE
ALIGNMENT CHECKED
RT. OF WAY CHECKED
CADD FILE NAME

PROFILE
SURVEYED
PLOTTED
CROSS CHECKED
B.M. NOTED
STRUCTURE NOTATNS CHKD
NOTE BOOK
NO.
BY
DATE



SURVEY DATE FROM DECEMBER 12, 2012 TO JANURARY 11, 2013
ELEVATIONS ARE PROVIDED IN DATUM NGVD29

VERTICAL SCALE: 1" = 10'
HORIZONTAL SCALE: 1" = 100' (0.0189 MILE)

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	PLOT SCALE = 50.0000 ' / in.	DRAWN -	REVISED -
Default	PLOT DATE = 9/24/2014	CHECKED -	REVISED -
		DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK
EXHIBIT D – STREAMBED PROFILE

SCALE: | SHEET OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			2	D-2
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

EXHIBIT E

ROADWAY PROFILE AND HISTORIC PLANS

E.B. SAWMILL CREEK

STA 432+68.68 N FRONTAGE RD
LOW EOP ELEV = 690.86

EXISTING ROW

I–55 FRONTAGE N

STA 432+21.78 OVERTOPPING
ELEV = 691.24

12'x5' BOX CULVERT
STR NO 022-0513

℄ I–55

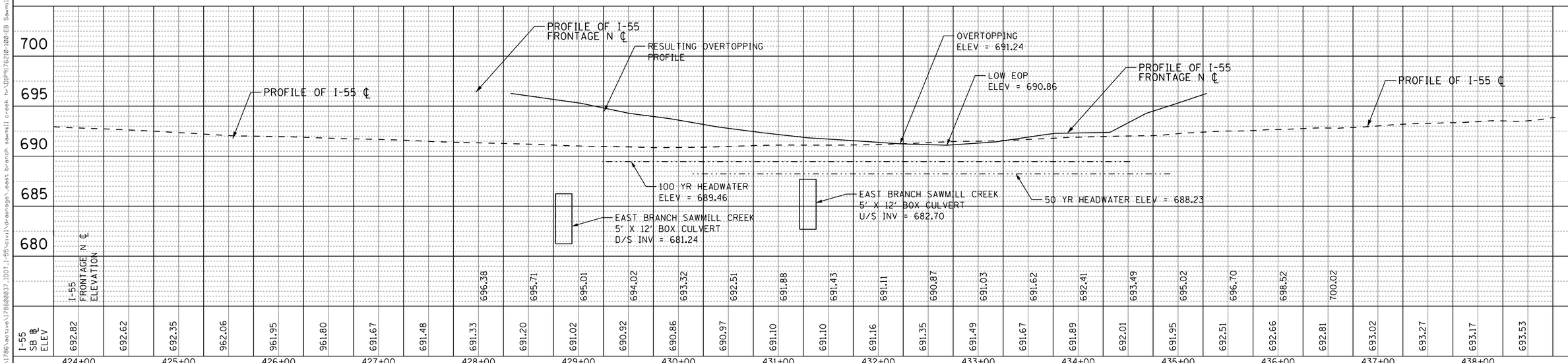
425+00 430+00 435+00

STA 430+07.77 ℄ I-55
STA 71+70.61 ℄ EAST
BRANCH SAWMILL CREEK

I–55 FRONTAGE S

EXISTING ROW

ELEVATIONS ARE PROVIDED IN DATUM NGVD29



USER NAME = dbook	DESIGNED - DJB	REVISED -
	DRAWN - STANTEC	REVISED -
PLOT SCALE = 50.0000 ' / in.	CHECKED - JVO	REVISED -
PLOT DATE = 10/27/2015	DATE - 10/12/2015	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

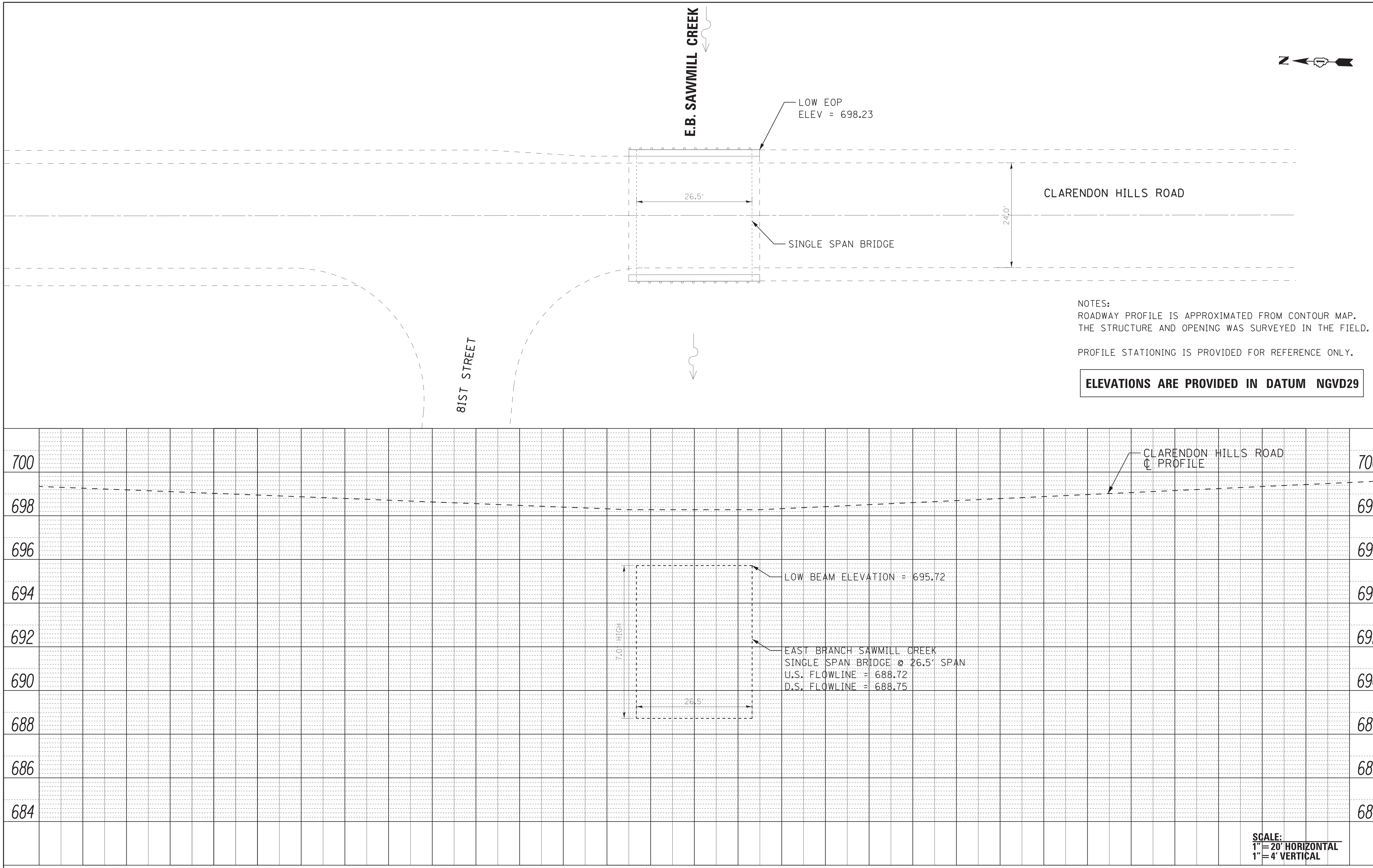
I–55 MANAGED LANE STUDY
E.B. SAWMILL CREEK – PLAN AND PROFILE

SCALE: 1": 50' | SHEET OF SHEETS | STA. | TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
55		DUPAGE/COOK	110	
		CONTRACT NO. P9176210		
	ILLINOIS FED. AID PROJECT			

FILE NAME = V:\1786\active\178600037.IDOT.I-55\civil\drainage\east branch sawmill creek hw\DP9176210-100 EB Sawmill Creek Plan&Profdgn

Default



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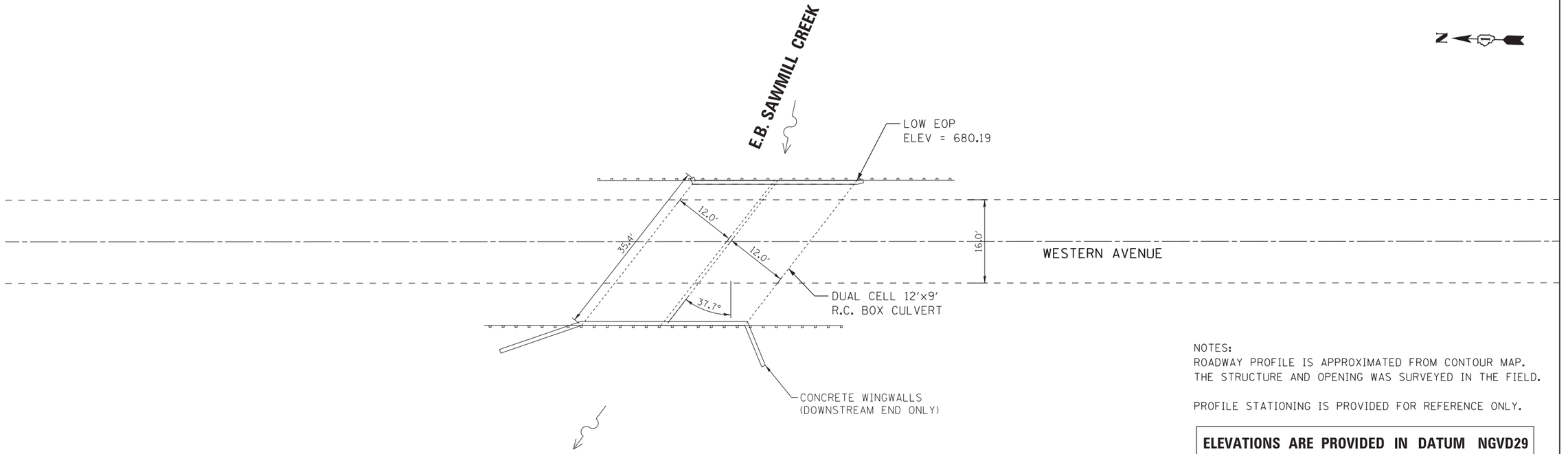
	PLOT SCALE = 10.0000 '/ in.	DRAWN -	REVISED -		SCALE: SHEET OF SHEETS STA. TO STA.
Default	PLOT DATE = 3/9/2016	CHECKED -	REVISED -		
		DATE -	REVISED -		

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			



PLAN
SURVEYED
PLOTTED
DRAWN
ALIGNMENT CHECKED
RT. OF WAY CHECKED
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE

PROFILE
SURVEYED
PLOTTED
DRAWN
CHECKED
B.M. NOTED
STRUCTURE NOTATNS CHKD
NOTE BOOK
NO.
BY
DATE

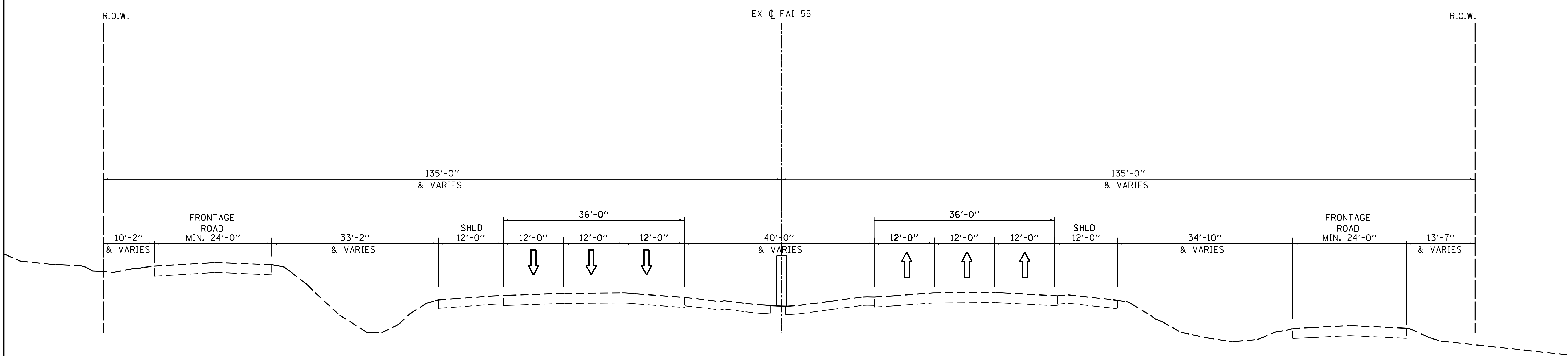
FILE NAME = V:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\DIP91762\Default	USER NAME = dbook	DESIGNED -	REVISED -
		DRAWN	REVISED -
	PLOT SCALE = 10.0000 ' / in.	CHECKED -	REVISED -
	PLOT DATE = 3/9/2016	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

WESTERN AVENUE OVER EAST BRANCH SAWMILL CREEK
EXHIBIT E – ROADWAY PLAN & PROFILE

SCALE: | SHEET OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			



EXISTING I-55 TYPICAL SECTION

NORTH/SOUTH OF CASS AVENUE

STA 337+00 TO STA 430+00

(LOOKING NORTH)

FILE NAME = V:\1786\active\178600037_IDOT_I-55\civil\drawing\sht\Exhibit\D1P917621D-typicals-sheets_North of Cass.dgn

I-55 MANAGED LANE PROJECT

USER NAME = mjverheyen	DESIGNED - MJV	REVISED -	STATE OF ILLINOIS
	DRAWN - STANTEC	REVISED -	DEPARTMENT OF TRANSPORTATION
PLOT SCALE = 20.0000 ' / in.	CHECKED - CL	REVISED -	
PLOT DATE = 8/28/2014	DATE - 8/28/2014	REVISED -	

TYPICAL SECTIONS

SCALE: SHEET OF SHEETS STA. TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
55		DUPAGE/COOK		

CONTRACT NO.

ILLINOIS FED. AID PROJECT

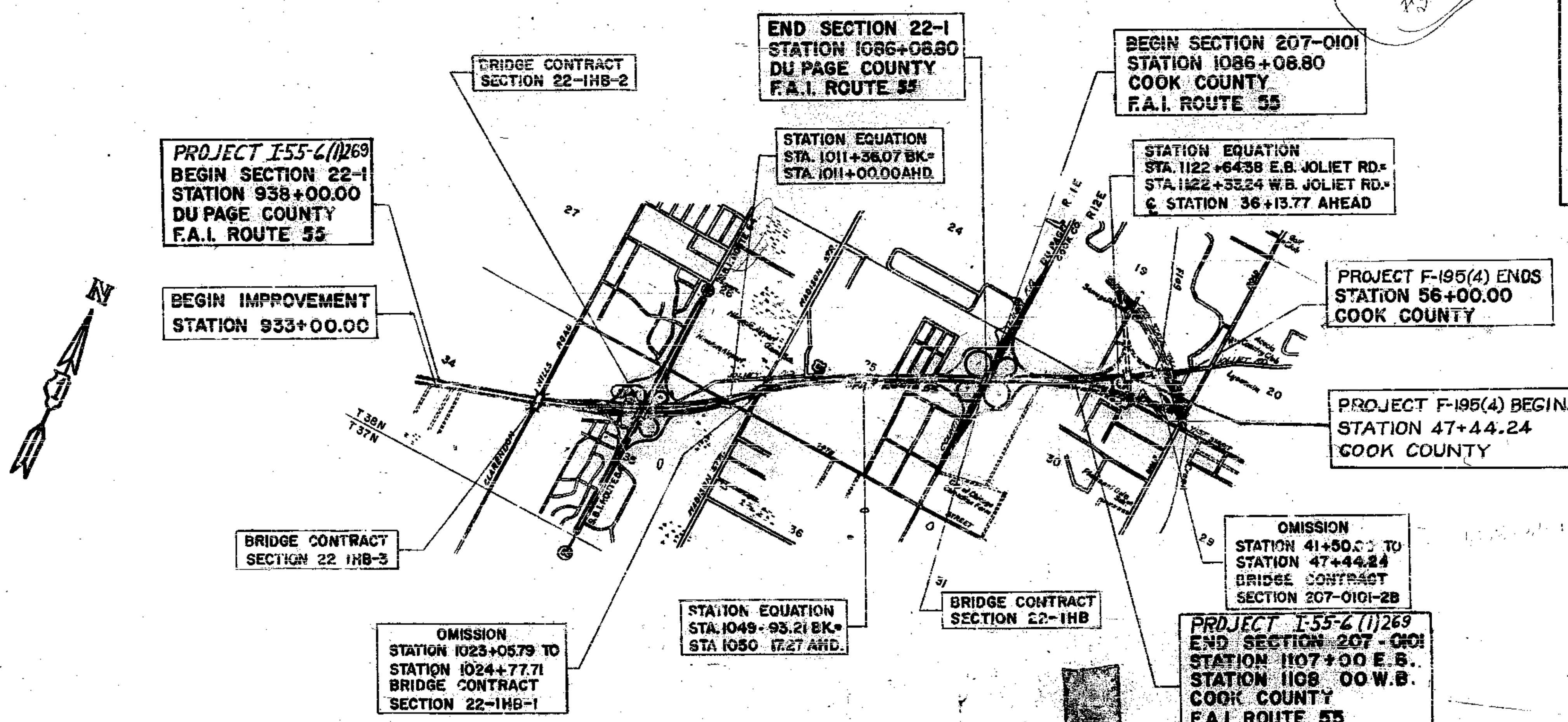
FEDERAL AID ROUTE NO.	SEC.	COUNTY	TOTAL SHEETS	SHEET NO.
F.A.I.55	22-1B 207-0101	DU PAGE & COOK	265	1
FED ROAD DIST. NO. 7	ILLINOIS	PROJECT	I-55-6(1)269 F-195(4)	

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS
PLANS FOR PROPOSED
FEDERAL - AID INTERSTATE HIGHWAY

SCALES
- PLAN 1 INCH 100 FT.
- PROFILE. HOR. 1 INCH 100 FT.
- PROFILE. VERT. 1 INCH 10 FT.
- CROSS-SECTIONS 1 INCH 5 FT.

F.A.I. ROUTE 55
SECTIONS 22-1 & 207-0101
PROJECT I-55-6(1)269 & F-195(4)
I-03-6 (1)
DU PAGE AND COOK COUNTIES

#37 and #379



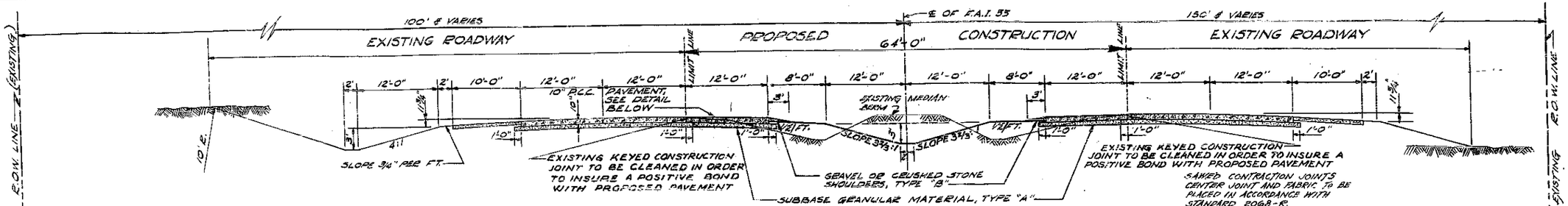
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS

SUBMITTED April 8 1957
D. S. Magee
EXAMINED May 28 1958
A. W. Van Auda...
PASSED May 28 1956
APPROVED May 28 1956
B. B. Bartelamey
CHIEF HIGHWAY ENGINEER
APPROVED May 28 1956

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
APPROVED [redacted]
DIVISION ENGINEER DATE

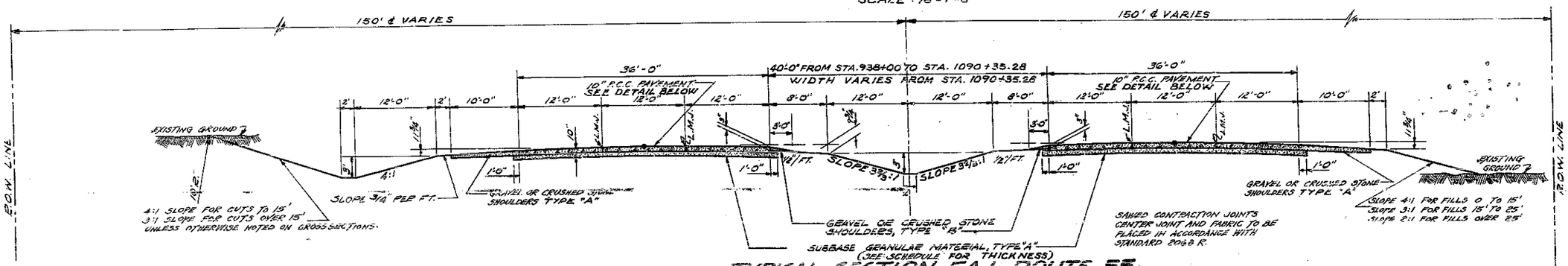
Index of Sheets and Summary of Quantities on Sheet No. 8

NET LENGTH OF PROJECT F-195(4)	855.76 LIN. FT.	0.162 MILES
GROSS LIMITS OF CONTRACT SECTION 22-1	15,320.81 LIN. FT.	2.902 MILES
NET LIMITS OF CONTRACT SECTION 22-1	14,648.89 LIN. FT.	2.774 MILES
GROSS LIMITS OF CONTRACT SECTION 207-0101	[illegible]	[illegible] MILES
NET LIMITS OF CONTRACT SECTION 207-0101	2,191.20 LIN. FT.	0.415 MILES
NET LENGTH OF PROJECT I-55-6 (1) 269	16840.09 LIN. FT.	3.189 MILES



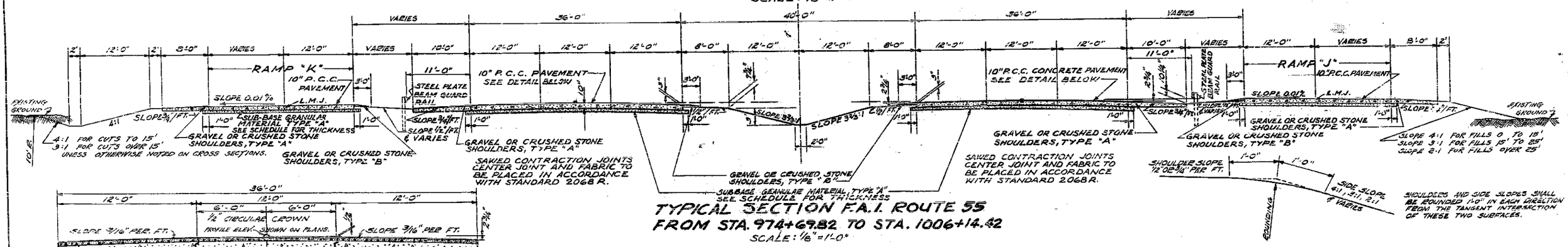
TYPICAL SECTION F.A.I. ROUTE 55 FROM STA. 933+00 TO STA. 938+00

SCALE : 1/8" = 1'-0"



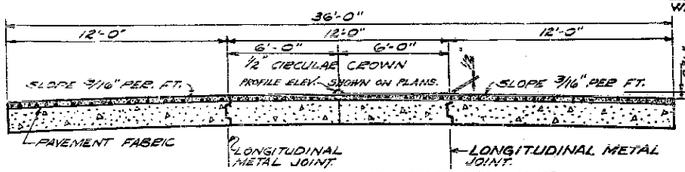
TYPICAL SECTION F.A.I. ROUTE 55 FROM STA. 938+00.00 TO STA. 974+69.82 & FROM STA. 1006+14.42 TO STA. 1090+35.28 E.B. LANE STA. 1098+88.98 W.B. LANE

SCALE : 1/8" = 1'-0"



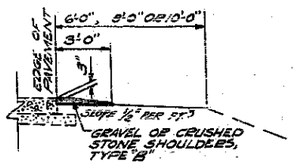
TYPICAL SECTION F.A.I. ROUTE 55 FROM STA. 974+69.82 TO STA. 1006+14.42

SCALE : 1/8" = 1'-0"



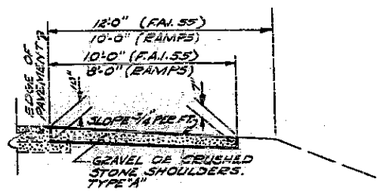
DETAIL OF F.A.I. ROUTE 55 10" P.C.C. PAVEMENT SLAB

SCALE : 1/4" = 1'-0" HORIZ.
1/2" = 1'-0" VERT.



DETAIL OF 3' GRAVEL OR CRUSHED STONE SHOULDER

SCALE: 1/4" = 1'-0"



DETAIL OF 10' OR 8' GRAVEL OR CRUSHED STONE SHOULDER

SCALE : 1/4" = 1'-0"

TYPICAL SHOULDER ROUNDING DETAIL FOR ALL ROADWAY SECTIONS

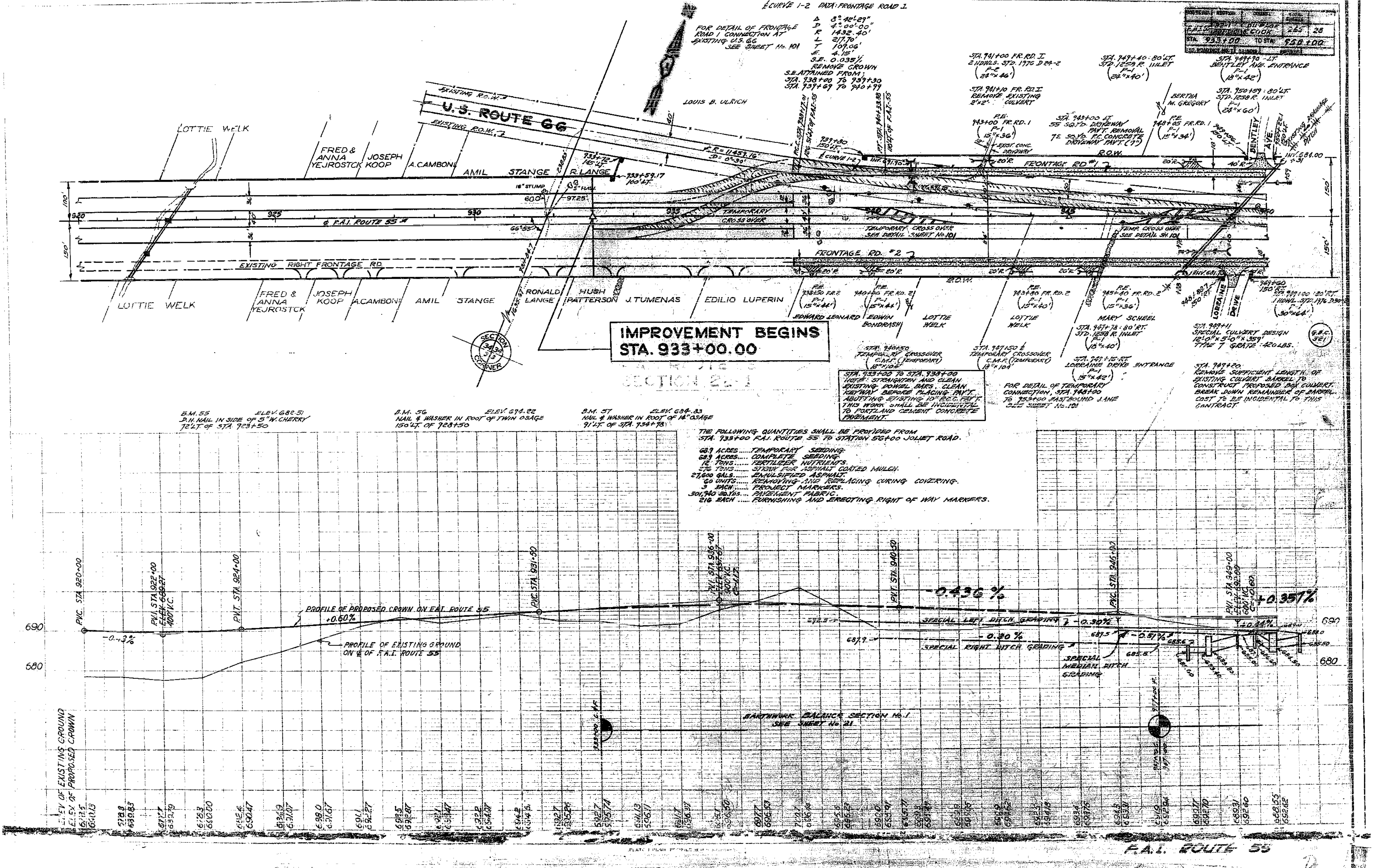
SCALE : 1" = 1'-0"

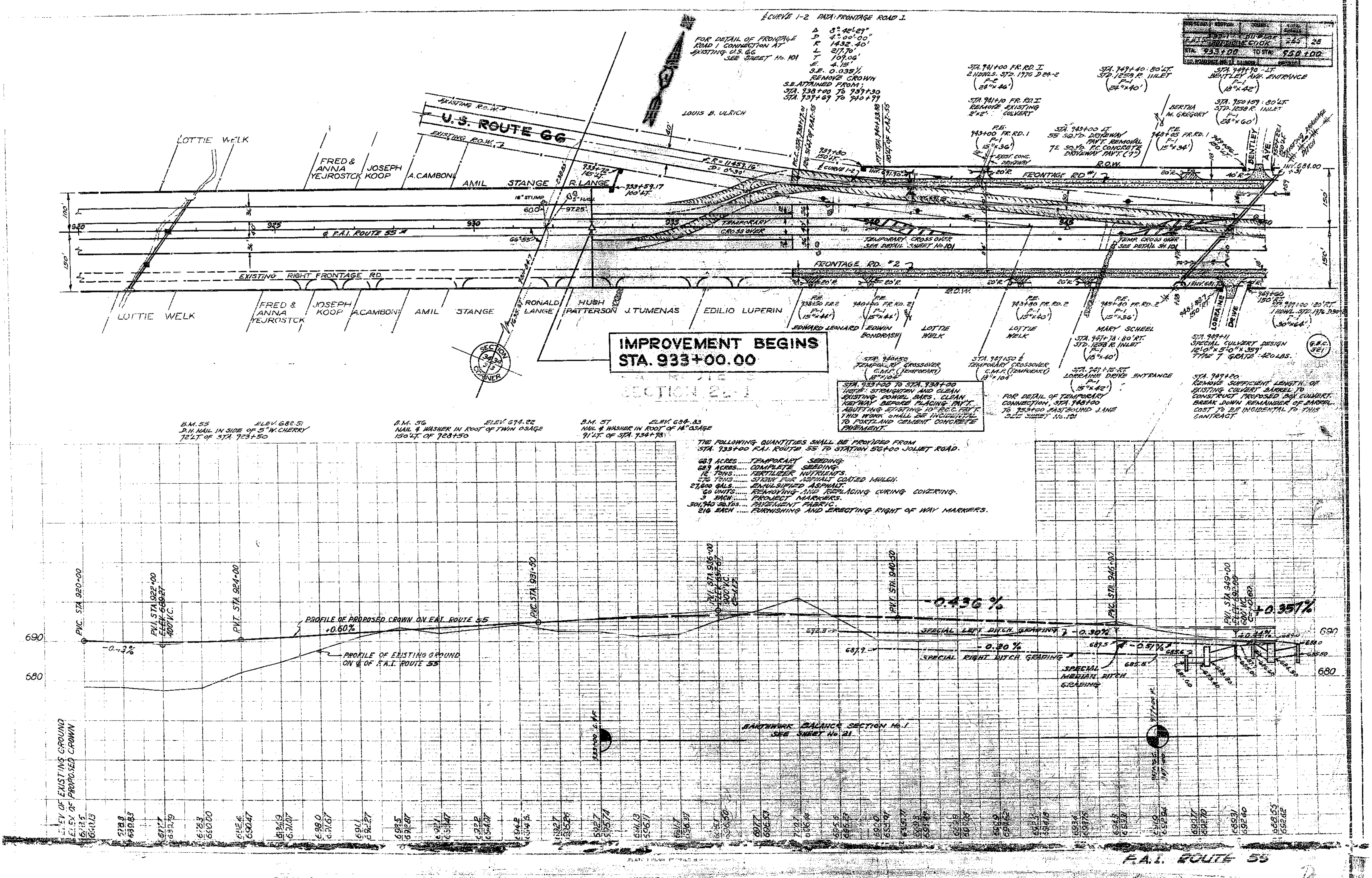
TYPICAL SECTION
F.A.I. ROUTE 55
SECTION 22-1 & 207-0101
DU PAGE & COOK COUNTIES

SCALE: AS NOTED

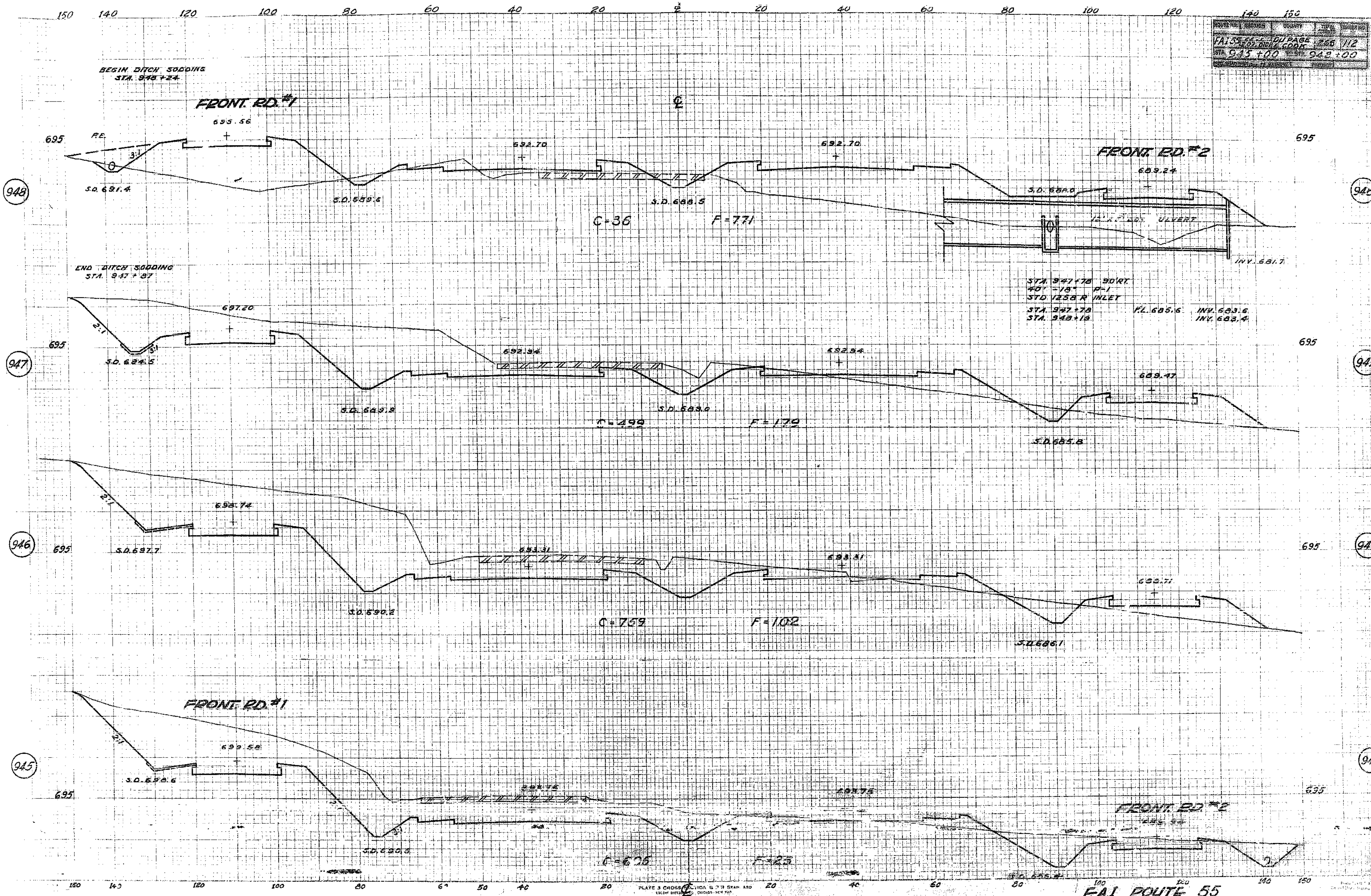
DESIGN DESIGNATION
COUNTY LINE ROAD 160-M-50

PERMISSIBLE AXLE LOAD
TANDEM
SINGLE : 18,000 LBS.

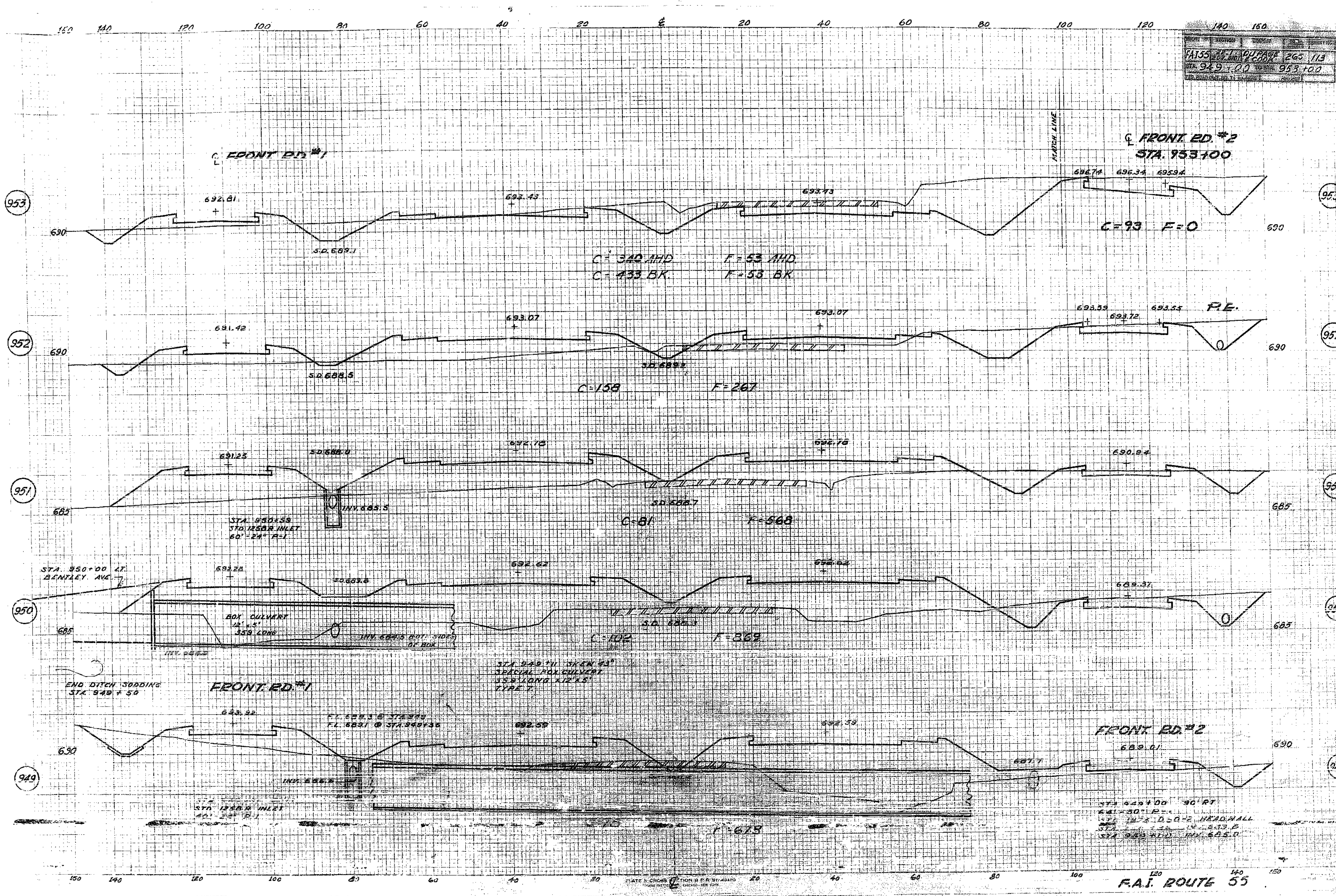

F.A.I. 55 DU PAGE COOK 25
STA. 933+00 TO STA. 950+00
℄ CURVE 1-2 DATA: FRONTAGE ROAD 1
Δ 8° 42' 29"
D 4° 00' 00"
R 1432.40'
L 217.70'
T 109.06'
E 4.15'
S.E. 0.035'/'
REMOVE CROWN
S.E. ATTAINED FROM:
STA. 938+00 TO 939+30
STA. 939+69 TO 940+99
FOR DETAIL OF FRONTAGE ROAD 1 CONNECTION AT EXISTING U.S. 66 SEE SHEET No. 101
U.S. ROUTE 66
EXISTING R.O.W.
LOUIS B. ULRICH
LOTTIE WELK
FRED & ANNA YEJROSTCK
JOSEPH KOOP
A.CAMBONI
AMIL STANGE
R.LANGE
FRONTAGE RD. #1
FRONTAGE RD. #2
TEMPORARY CROSS OVER
TEMPORARY CROSS OVER SEE DETAIL SHEET No. 101
℄ F.A.I. ROUTE 55
EXISTING RIGHT FRONTAGE RD.
RONALD LANGE
HUGH PATTERSON
J. TUMENAS
EDILIO LUPERIN
EDWARD LEONARD
EDWIN BONDRASH
MARY SCHEEL
BERTHA M. GREGORY
BENTLEY AVE.
LORRAINE DRIVE
IMPROVEMENT BEGINS
STA. 933+00.00
STA. 941+00 FR. RD. I 2 HDWLS. STD. 1976 D 24-2 (P-2 24"x46')
STA. 941+10 FR. RD. I REMOVE EXISTING 2'x2' CULVERT
STA. 943+00 LT. 55 SQ.YD. DRIVEWAY PAV'T. REMOVAL 72 SQ.YD. P.C. CONCRETE DRIVEWAY PAV'T. (7")
STA. 949+40 : 80' LT. STD. 1258 R. INLET (P-1 24"x40')
STA. 949+90 -LT BENTLEY AVE. ENTRANCE (P-1 18"x42')
STA. 950+59 : 80' LT. STD. 1258 R. INLET (P-1 24"x60')
STA. 940+50 TEMPORARY CROSSOVER C.M.P. (TEMPORARY) 18"x104'
STA. 947+50 ℄ TEMPORARY CROSSOVER C.M.P. (TEMPORARY) 18"x104'
STA. 947+78 : 80' RT. STD. 1258 R. INLET (P-1 18"x40')
STA. 949+15 RT. LORRAINE DRIVE ENTRANCE (P-1 15"x42')
STA. 949+11 SPECIAL CULVERT DESIGN 12'-0"x5'-0"x359' TYPE 7 GRATE : 420 LBS.
STA. 933+00 TO STA. 938+00 NOTE: STRAIGHTEN AND CLEAN EXISTING DOWEL BARS. CLEAN KEYWAY BEFORE PLACING PAV'T. ABUTTING EXISTING 10" P.C.C. PAV'T. THIS WORK SHALL BE INCIDENTAL TO PORTLAND CEMENT CONCRETE PAVEMENT.
FOR DETAIL OF TEMPORARY CONNECTION, STA. 948+00 TO 953+00 EASTBOUND LANE SEE SHEET No. 101
STA. 949+20 REMOVE SUFFICIENT LENGTH OF EXISTING CULVERT BARREL TO CONSTRUCT PROPOSED BOX CULVERT. BREAK DOWN REMAINDER OF BARREL. COST TO BE INCIDENTAL TO THIS CONTRACT.
B.M. 55 ELEV. 682.51 D.H. NAIL IN SIDE OF 5" W. CHERRY 72' LT. OF STA. 923+50
B.M. 56 ELEV. 694.22 NAIL & WASHER IN ROOT OF TWIN OSAGE 150' LT. OF 928+50
B.M. 57 ELEV. 684.83 NAIL & WASHER IN ROOT OF 14" OSAGE 91' LT. OF STA. 934+78
THE FOLLOWING QUANTITIES SHALL BE PROVIDED FROM STA. 933+00 F.A.I. ROUTE 55 TO STATION 56+00 JOLIET ROAD.
68.9 ACRES ..... TEMPORARY SEEDING.
68.9 ACRES ..... COMPLETE SEEDING.
12 TONS ..... FERTILIZER NUTRIENTS.
TONS ..... STRAW FOR ASPHALT COATED MULCH.
27,600 GALS ..... EMULSIFIED ASPHALT.
60 UNITS ..... REMOVING AND REPLACING CURING COVERING.
3 EACH ..... PROJECT MARKERS.
301,940 SQ.YDS. ... PAVEMENT FABRIC.
216 EACH ..... FURNISHING AND ERECTING RIGHT OF WAY MARKERS.
PROFILE OF PROPOSED CROWN ON F.A.I. ROUTE 55
PROFILE OF EXISTING GROUND ON ℄ OF F.A.I. ROUTE 55
+0.60%
-0.43%
-0.436%
+0.357%
SPECIAL LEFT DITCH GRADING
SPECIAL RIGHT DITCH GRADING
SPECIAL MEDIAN DITCH GRADING
EARTHWORK BALANCE SECTION No. 1 SEE SHEET No. 21
ELEV. OF EXISTING GROUND
ELEV. OF PROPOSED CROWN
690
680
F.A.I. ROUTE 55



℄ CURVE 1-2 DATA: FRONTAGE ROAD 1
Δ 8° 42' 29"
D 4° 00' 00"
R 1432.40'
L 217.70'
T 109.06'
E 4.15'
S.E. 0.035%
REMOVE CROWN
S.E. ATTAINED FROM:
STA. 938+00 TO 939+30
STA. 939+69 TO 940+99
FOR DETAIL OF FRONTAGE ROAD 1 CONNECTION AT EXISTING U.S. 66 SEE SHEET No. 101
LOUIS B. ULRICH
U.S. ROUTE 66
EXISTING R.O.W.
LOTTIE WELK
FRED & ANNA YEJROSTCK
JOSEPH KOOP
A. CAMBONI
AMIL STANGE
R. LANGE
℄ F.A.I. ROUTE 55
TEMPORARY CROSS OVER
FRONTAGE RD. #1
FRONTAGE RD. #2
EXISTING RIGHT FRONTAGE RD.
RONALD LANGE
HUGH PATTERSON
J. TUMENAS
EDILIO LUPERIN
EDWARD LEONARD
EDWIN BONDRASH
MARY SCHEEL
BERTHA M. GREGORY
BENTLEY AVE.
LORRAINE DRIVE
STA. 941+00 FR. RD. I 2 HDWLS. STD. 1976 D 24-2 (P-2 24"x46')
STA. 941+10 FR. RD. I REMOVE EXISTING 2'x2' CULVERT
IMPROVEMENT BEGINS STA. 933+00.00
NOTE: STRAIGHTEN AND CLEAN EXISTING DOWEL BARS. CLEAN KEYWAY BEFORE PLACING PAV'T. ABUTTING EXISTING 10" P.C.C. PAV'T. THIS WORK SHALL BE INCIDENTAL TO PORTLAND CEMENT CONCRETE PAVEMENT.
B.M. 55 ELEV. 682.51
B.M. 56 ELEV. 674.22
B.M. 57 ELEV. 684.83
THE FOLLOWING QUANTITIES SHALL BE PROVIDED FROM STA. 933+00 F.A.I. ROUTE 55 TO STATION 56+00 JOLIET ROAD.
68.9 ACRES ...... TEMPORARY SEEDING.
68.9 ACRES ...... COMPLETE SEEDING.
12 TONS ...... FERTILIZER NUTRIENTS.
TONS ...... STRAW FOR ASPHALT COATED MULCH.
27,600 GALS ...... EMULSIFIED ASPHALT.
60 UNITS ...... REMOVING AND REPLACING CURING COVERING.
3 EACH ...... PROJECT MARKERS.
301,940 SQ. YDS. ... PAVEMENT FABRIC.
216 EACH ...... FURNISHING AND ERECTING RIGHT OF WAY MARKERS.
PROFILE OF PROPOSED CROWN ON F.A.I. ROUTE 55
PROFILE OF EXISTING GROUND ON ℄ OF F.A.I. ROUTE 55
SPECIAL LEFT DITCH GRADING
SPECIAL RIGHT DITCH GRADING
SPECIAL MEDIAN DITCH GRADING
EARTHWORK BALANCE SECTION No. 1 SEE SHEET No. 21
ELEV. OF EXISTING GROUND
ELEV. OF PROPOSED CROWN
F.A.I. ROUTE 55



F.A.I. 55
DU PAGE COOK
STA. 945+00
948+00
BEGIN DITCH SODDING
STA. 948+24
FRONT. RD. #1
FRONT. RD. #2
695.56
692.70
689.24
S.D. 691.4
S.D. 689.6
S.D. 688.5
S.D. 688.0
C=36
F=771
INV. 681.7
END DITCH SODDING
STA. 947+87
STA. 947+78 90°RT.
STD 1258 R INLET
STA. 947+78
STA. 948+19
F.L. 685.6
INV. 683.6
INV. 683.4
697.20
692.94
689.47
S.D. 684.5
S.D. 689.9
S.D. 688.0
S.D. 685.8
F=179
698.74
693.31
690.71
S.D. 697.7
S.D. 690.2
S.D. 686.1
C=759
F=102
699.58
S.D. 698.6
S.D. 690.5
F=23
695
948
947
946
945
F.A.I. ROUTE 55



FAI 55
DU PAGE & COOK
265
113
949+00
953+00
℄ FRONT RD. #1
℄ FRONT RD. #2
STA. 953+00
MATCH LINE
953
952
951
950
949
690
685
692.81
693.43
693.43
696.74
696.34
695.94
S.D. 689.1
C=93 F=0
C=340 AHD F=53 AHD
C=433 BK. F=53 BK.
691.42
693.07
693.07
693.59
693.72
693.55
P.E.
S.D. 688.5
C=158
F=267
691.25
S.D. 688.0
692.76
692.76
690.84
INV. 685.5
S.D. 688.7
STA. 950+55
STD. 1258R INLET
60'-24" R-1
C=81
F=568
STA. 950+00 LT.
BENTLEY AVE.
692.28
692.62
692.62
689.37
BOX CULVERT
12'x5'
359 LONG
S.D. 688.3
C=102
F=862
STA. 949+11 SKEW 43°
SPECIAL BOX CULVERT
359' LONG x 12 x 5'
TYPE 1.
END DITCH SODDING
STA. 949+50
FRONT RD. #1
FRONT RD. #2
693.92
692.59
692.59
689.01
687.7
STD. 1258 R INLET
F=678
STA. 949+00 90' RT
F.A.I. ROUTE 55

EXHIBIT F

CROSS SECTIONS

CLARENDON HILLS ROAD

APPROXIMATE LIMITS
OF FIS FLOODPLAIN

INTERSTATE 55

FERN STREET

LORRAINE DRIVE

ALABAMA
AVENUE

X-SEC 60+09.00 (MILE=4.535)

X-SEC 64+92.35 (MILE=4.542)

X-SEC 66+86.62 (MILE=4.504)

X-SEC 69+83.28 (MILE=4.449)

X-SEC 70+15.18 (MILE=4.442)

X-SEC 73+58.47 (MILE=4.378)

X-SEC 77+11.04 (MILE=4.290)

X-SEC 82+81.27 (MILE=4.210)

FIS SECTION SMW 4608 (MILE 4.536)

TENNESSE AVENUE

PROJECT LOCATION

N. FRONTAGE ROAD

S. FRONTAGE ROAD

EAST BRANCH SAWMILL CREEK

SURVEYED RECEPTOR – RESIDENCE
POINT#11534
LOW WATER ENTRY = 691.51

GRAPHIC SCALE
METERS
20 0 20 40 60 80 100
50 0 50 100 150 200 250
FEET

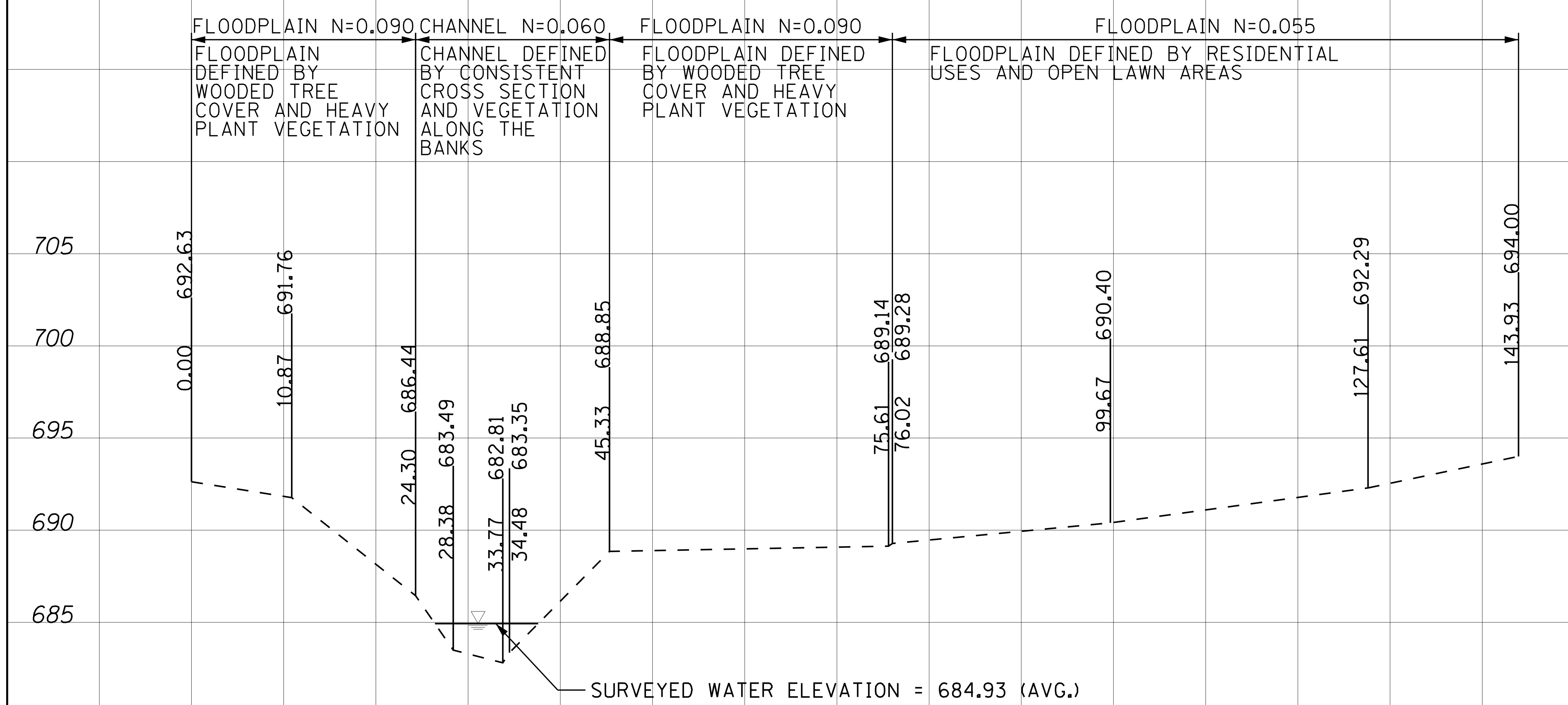
FILE NAME = V:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\DIP91686-aerial.dgn	USER NAME = dbook	DESIGNED -	REVISED -
		DRAWN -	REVISED -
	PLOT SCALE = 80.0000 ' / in.	CHECKED -	REVISED -
Default	PLOT DATE = 2/18/2016	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

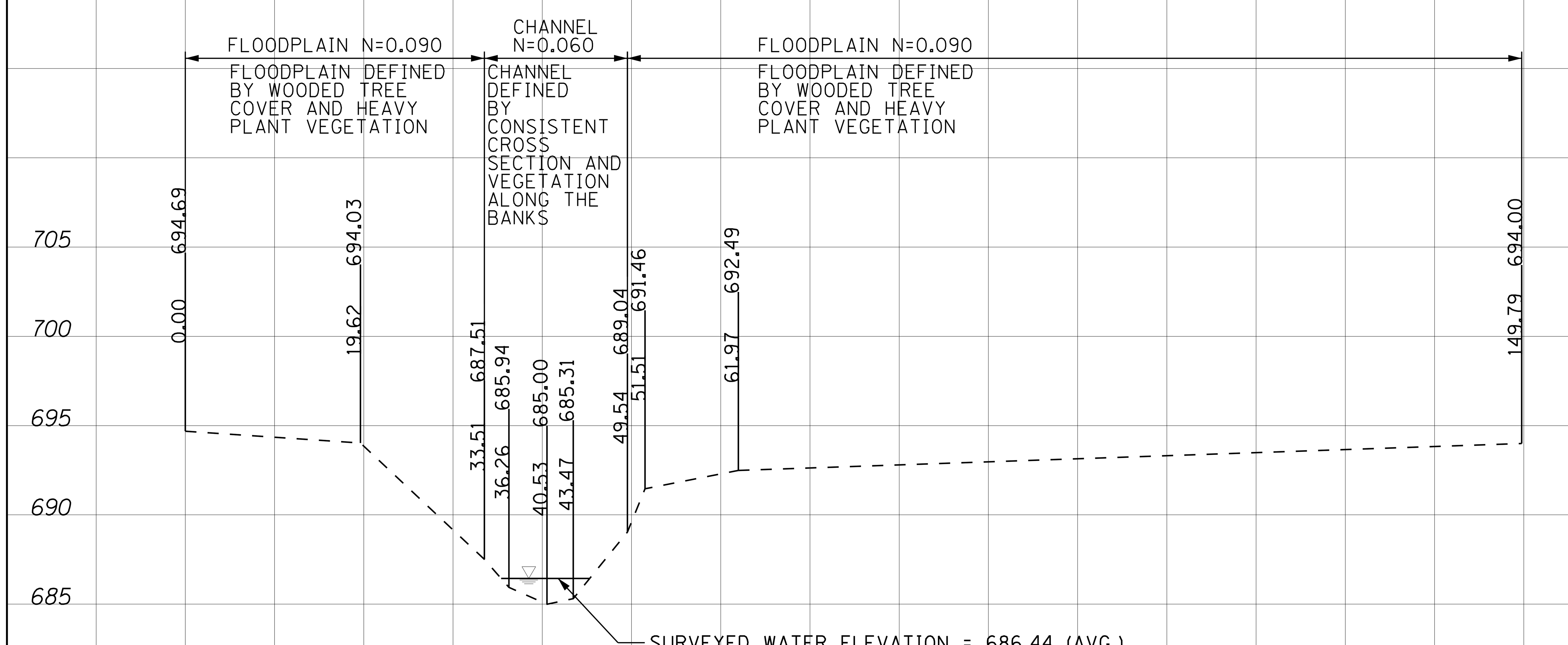
INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK
EXHIBIT F – CROSS SECTION LOCATION EXHIBIT

SCALE: | SHEET OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			



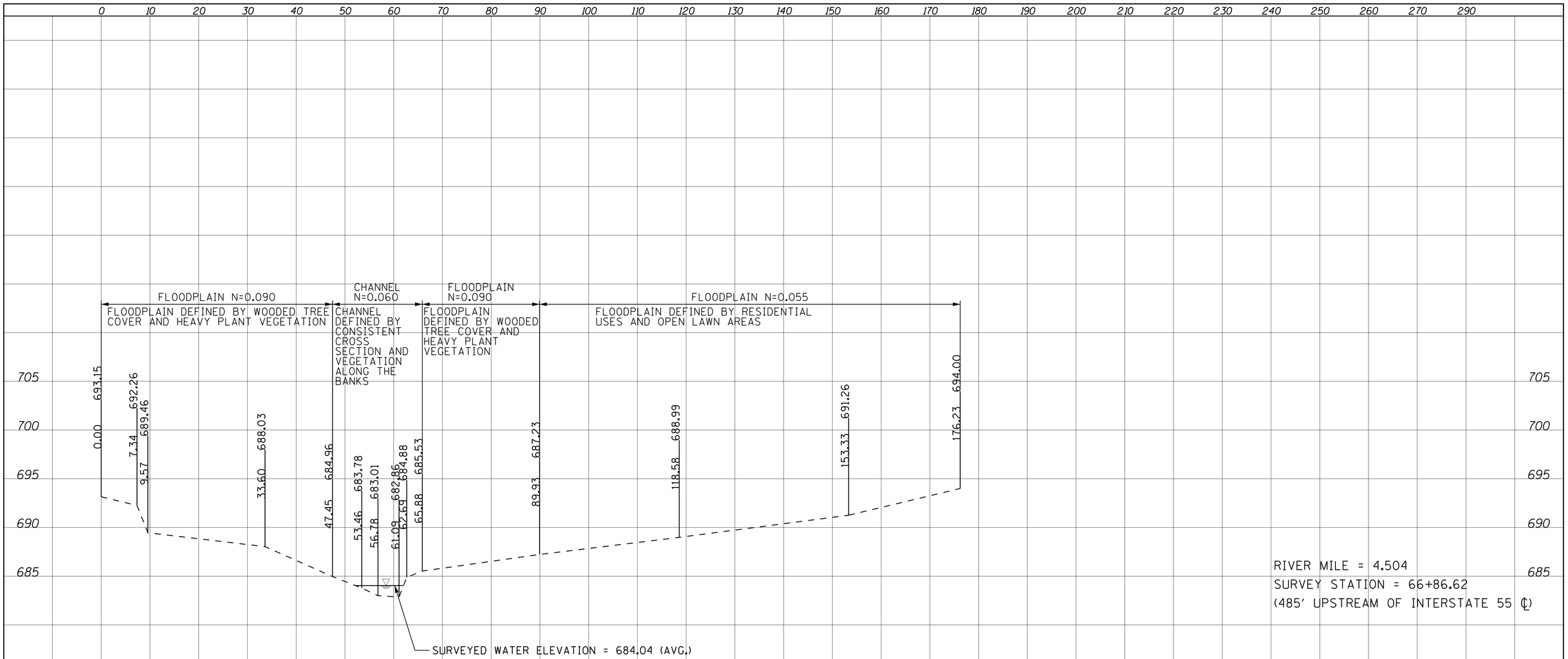
RIVER MILE = 4.542
SURVEY STATION 64+92.35
(680' UPSTREAM OF INTERSTATE 55 ℄)



RIVER MILE = 4.635
SURVEY STATION 60+00.00
(1170' UPSTREAM OF INTERSTATE 55 ℄)

NOTE: CROSS SECTIONS LOOKING DOWNSTREAM
SURVEY DATE: DECEMBER 12, 2012 TO JANUARY 11, 2013
(ALL ELEVATIONS IN NGVD29 DATUM)

FILE NAME =	USER NAME = cide	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK EXHIBIT F – CROSS SECTION	F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
V:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\D1P9176210-sht-...dgn	PLOT SCALE = 10.0000 ' / in.	DRAWN -	REVISED -							1
Default	PLOT DATE = 12/11/2013	CHECKED -	REVISED -		SCALE: SHEET OF SHEETS STA. 60+00.00 TO STA. 64+92.35			CONTRACT NO.		
		DATE -	REVISED -			ILLINOIS FED. AID PROJECT				



NOTE: CROSS SECTIONS LOOKING DOWNSTREAM
SURVEY DATE: DECEMBER 12, 2012 TO JANUARY 11, 2013
(ALL ELEVATIONS IN NGVD29 DATUM)

FINAL SURVEY — NOTE BOOK — NO. — SURVEYED — PLOTTED — TEMPLATE — AREAS — AREAS CHECKED — BY — DATE

ORIGINAL SURVEY — NOTE BOOK — NO. — SURVEYED — PLOTTED — TEMPLATE — AREAS — AREAS CHECKED — BY — DATE

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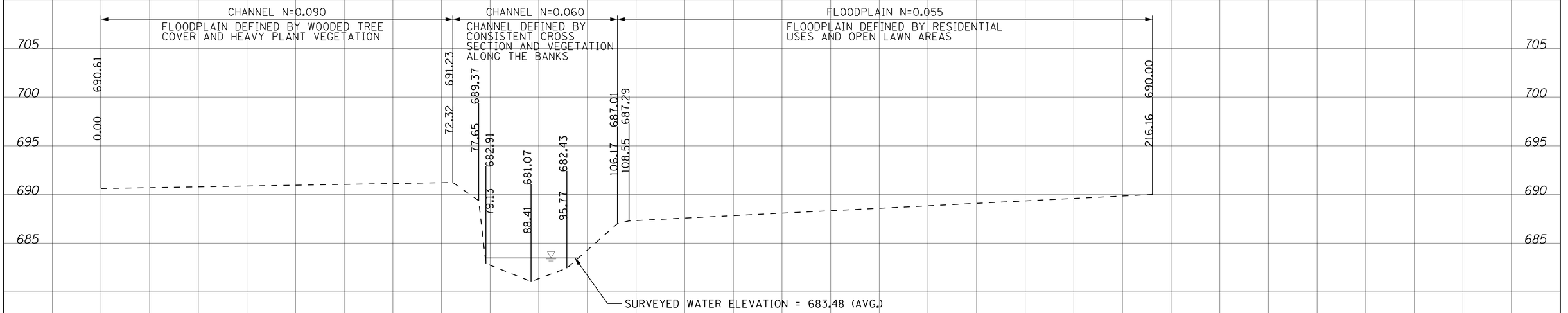
		DRAWN -	REVISED -
	PLOT SCALE = 10.0000 ' / in.	CHECKED -	REVISED -
	PLOT DATE = 12/11/2013	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK
EXHIBIT F – CROSS SECTION

SCALE: | SHEET OF SHEETS | STA. 66+86.62 TO STA. 70+15.18

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
				2
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			



RIVER MILE = 4.449
SURVEY STATION = 69+83.28
(UPSTREAM FACE OF CULVERT)

NOTE: CROSS SECTIONS LOOKING DOWNSTREAM
SURVEY DATE: DECEMBER 12, 2012 TO JANUARY 11, 2013
(ALL ELEVATIONS IN NGVD29 DATUM)

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 290

FINAL SURVEY — NOTE BOOK — NO. — SURVEYED — PLOTTED — TEMPLATE — AREAS — AREAS CHECKED — BY — DATE

ORIGINAL SURVEY — NOTE BOOK — NO. — SURVEYED — PLOTTED — TEMPLATE — AREAS — AREAS CHECKED — BY — DATE

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Default	PLOT DATE = 12/11/2013	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK
EXHIBIT F – CROSS SECTION

SCALE: | SHEET OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
				3

CONTRACT NO.

ILLINOIS FED. AID PROJECT

NOTE: CROSS SECTIONS LOOKING DOWNSTREAM
SURVEY DATE: DECEMBER 12, 2012 TO JANUARY 11, 2013
(ALL ELEVATIONS IN NGVD29 DATUM)

FILE NAME = V:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\D1P9176210-sht.dgn	USER NAME = cide	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK EXHIBIT F – CROSS SECTION
Default	PLOT SCALE = 10.0000 ' / in.	DRAWN -	REVISED -		SCALE: SHEET OF SHEETS STA. 66+86.62 TO STA. 70+15.18
	PLOT DATE = 12/11/2013	CHECKED -	REVISED -		
		DATE -	REVISED -		

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
				4
		CONTRACT NO.		
ILLINOIS	FED. AID PROJECT			

NOTE: CROSS SECTIONS LOOKING DOWNSTREAM
SURVEY DATE: DECEMBER 12, 2012 TO JANUARY 11, 2013
(ALL ELEVATIONS IN NGVD29 DATUM)

FINAL SURVEY — NOTE BOOK NO. — SURVEYED — PLOTTED — TEMPLATE — AREAS — AREAS CHECKED — BY — DATE

ORIGINAL SURVEY — NOTE BOOK NO. — SURVEYED — PLOTTED — TEMPLATE — AREAS — BY — DATE

FILE NAME = V:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\D1P9176210-sht-...dgn	USER NAME = cide	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK EXHIBIT F – CROSS SECTION	F.A. RTE. / SECTION / COUNTY / TOTAL SHEETS / SHEET NO. 5
	PLOT SCALE = 10.0000 ' / in.	DRAWN -	REVISED -		SCALE: SHEET OF SHEETS STA. 66+86.62 TO STA. 70+15.18	CONTRACT NO.
Default	PLOT DATE = 12/11/2013	CHECKED -	REVISED -			ILLINOIS FED. AID PROJECT
		DATE -	REVISED -			

RIVER MILE = 4.378
SURVEY STATION = 73+58.47
(DOWNSTREAM FACE OF INTERSTATE 55 CULVERT)

NOTE: CROSS SECTIONS LOOKING DOWNSTREAM
SURVEY DATE: DECEMBER 12, 2012 TO JANUARY 11, 2013
(ALL ELEVATIONS IN NGVD29 DATUM)

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK
EXHIBIT F – CROSS SECTION

SCALE: SHEET OF SHEETS STA. 82+41.27 TO STA. 82+41.27

PLOT SCALE = 10.0000 ' / in.
PLOT DATE = 12/11/2013

DESIGNED –
DRAWN –
CHECKED –
DATE –
REVISED –

SHEET NO. 6
CONTRACT NO.
ILLINOIS FED. AID PROJECT

NOTE: CROSS SECTIONS LOOKING DOWNSTREAM
SURVEY DATE: DECEMBER 12, 2012 TO JANUARY 11, 2013
(ALL ELEVATIONS IN NGVD29 DATUM)

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Default
USER NAME = cide
PLOT SCALE = 10.0000 ' / in.
PLOT DATE = 12/11/2013
DESIGNED -
DRAWN -
CHECKED -
DATE -
REVISED -
REVISED -
REVISED -
REVISED -

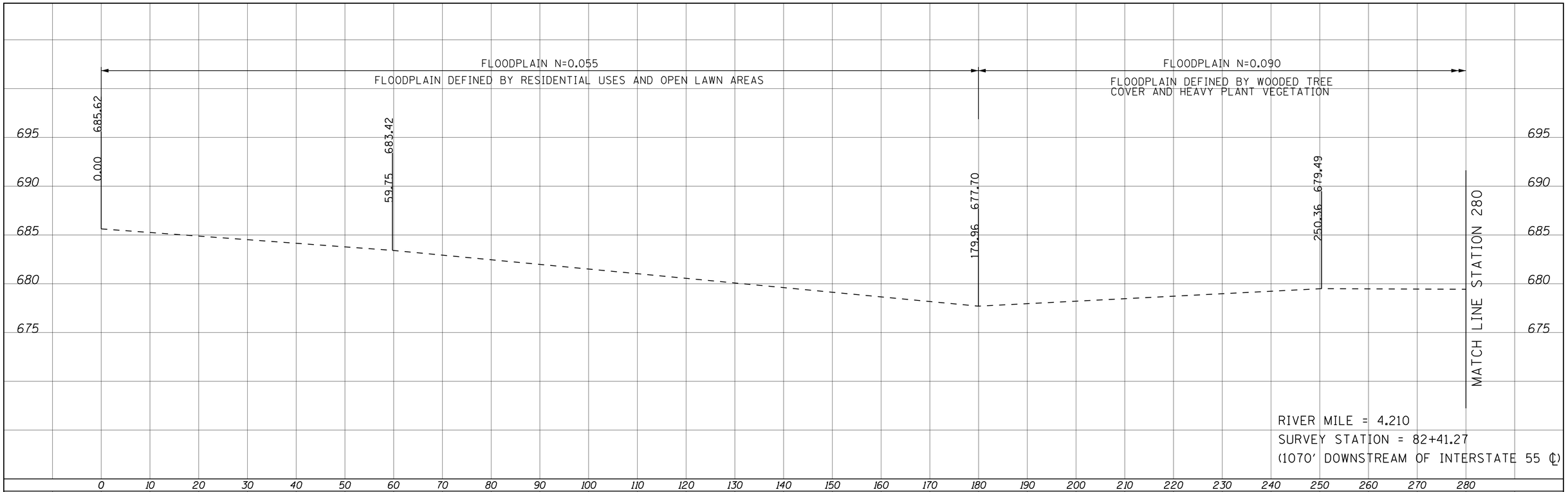
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

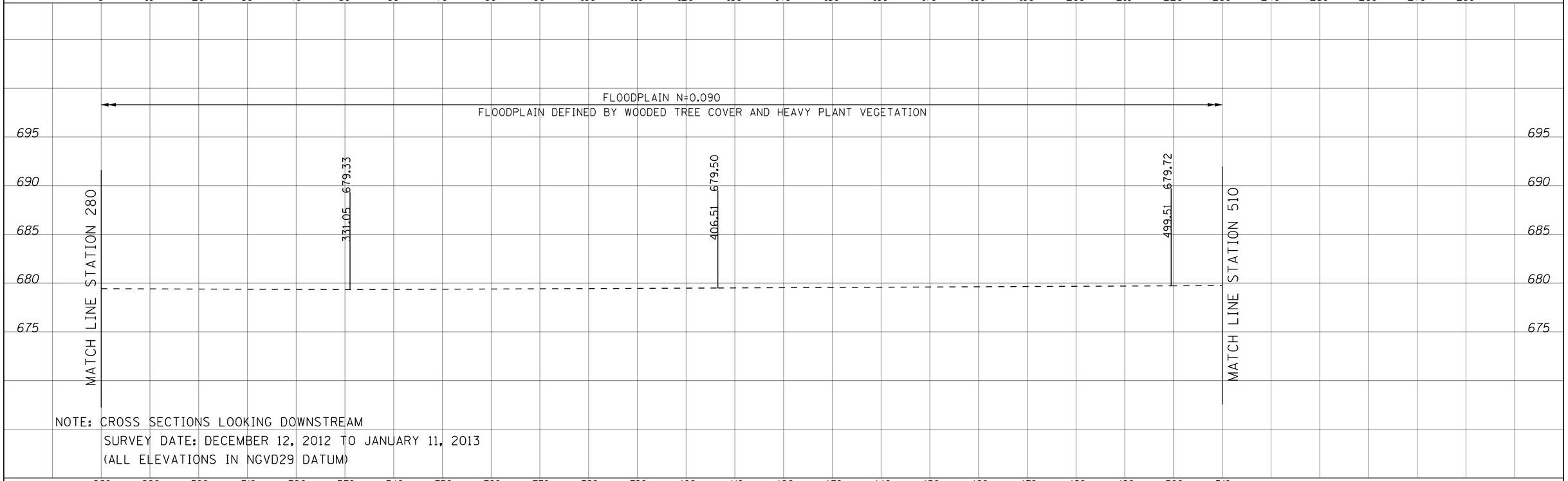
INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK
EXHIBIT F - CROSS SECTION

SCALE: SHEET OF SHEETS STA. 82+41.27 TO STA. 82+41.27

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
				7

CONTRACT NO.
ILLINOIS FED. AID PROJECT





NOTE: CROSS SECTIONS LOOKING DOWNSTREAM
SURVEY DATE: DECEMBER 12, 2012 TO JANUARY 11, 2013
(ALL ELEVATIONS IN NGVD29 DATUM)

FINAL SURVEY — NOTE BOOK — NO. — SURVEYED — PLOTTED — TEMPLATE — AREAS — AREAS CHECKED — BY — DATE

ORIGINAL SURVEY — NOTE BOOK — NO. — SURVEYED — PLOTTED — TEMPLATE — AREAS — AREAS CHECKED — BY — DATE

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		DRAWN -	REVISED -
	PLOT SCALE = 10.0000 ' / in.	CHECKED -	REVISED -
Default	PLOT DATE = 12/11/2013	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK
EXHIBIT F – CROSS SECTION

SCALE: | SHEET OF SHEETS | STA. 66+86.62 | TO STA. 70+15.18

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
				8

CONTRACT NO.

ILLINOIS FED. AID PROJECT

NOTE: CROSS SECTIONS LOOKING DOWNSTREAM
SURVEY DATE: DECEMBER 12, 2012 TO JANUARY 11, 2013
(ALL ELEVATIONS IN NGVD29 DATUM)

FILE NAME = V:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\D1P9176210-sht.dgn	USER NAME = cide	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK EXHIBIT F – CROSS SECTION
	PLOT SCALE = 10.0000 ' / in.	DRAWN -	REVISED -		
Default	PLOT DATE = 12/11/2013	CHECKED -	REVISED -		SCALE: SHEET OF SHEETS STA. 66+86.62 TO STA. 70+15.18
		DATE -	REVISED -		

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
				9
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

EXHIBIT G

MANNING'S N
ROUGHNESS COEFFICIENT

Interstate 55 (Steveson Expressway) over East Branch of Sawmill Creek

Analysis of Manning's N Roughness Coefficient Values

Procedure:

Roughness coefficients are computed in accordance with the procedure outlined in the IDOT Drainage Manual,
Chapter 5 - Open Channel Flow

Reference photographs of East Branch of Sawmill Creek and corresponding floodplain taken in December and February 14, 2013.

There are three types of channel and floodplain conditions identified within the area of study. A description of each type is provided below:

Item 1.

The stream channel flowing through the study area. The channel is defined by a consistent cross section and is flowing free with heavy plant growth on the banks. Portions of the cross sectional area are blocked with obstructions consisting of trees and cobbles.

Item 2.

Floodplain area generally defined by undeveloped land consisting of wooded tree cover and heavy plant vegetation. This floodplain item is located immediately adjacent to the channel throughout the study limits and is prominent downstream of the Interstate 55 crossing as part of the Forest Preserve property.

Item 3.

Floodplain area located along the upstream limits of the study and is comprised mainly of residental properities and open areas. The cross section is obstructed with scattered buildings and the surface is comprised of manicured lawns.

CHANNEL ROUGHNESS COEFFICIENT (ITEM #1)

$$n = (n_b + n_1 + n_2 + n_3 + n_4)\, m$$

Where:

n_b = a base value of n for a straight uniform, smooth channel in natural materials

n_1 = a value added to correct for the effect of surface irregularities

n_2 = a value for variations in shape and size of the channel cross section

n_3 = a value for obstructions

n_4 = a value for vegetation and flow conditions

m = a correction factor for meandering of the channel

Item #1 Channel Description

The stream channel flowing through the study area. The channel is defined by a consistent cross section and is flowing free with heavy plant growth on the banks. Portions of the cross sectional area are blocked with obstructions consisting of trees and cobbles.

This n-value is applied to the channel length througout the limits of the study.

Factor		Value	Description
Base Value	n_b =	0.032	Base material of channel is comprised of firm soil with evidence of cobbles throughout the limits.
Irregularity	n_1 =	0.003	Minor - compares to carefully dredged channels in good condition but having slightly eroded and scoured sideslopes.
Variation in Channel Cross Section	n_2 =	0.000	The size and shape of the channel cross slope sections change gradually.
Obstructions	n_3 =	0.005	Minor - obstructions occupy less than 15-percent of the cross sectional area.
Vegetation	n_4 =	0.020	Medium - the banks are comprised of moderately dense stemmy grass where the dpeth of flow is from two to three times the height. No significant vegetation is found along the channel bottom.
Meandering	m =	1.000	Minor - The ratio of the channel length to the valley length is 1.0 to 1.2
Item 1: Calculated Channel Roughness Coefficient, n =		0.060	
Approximates the Regulatory Model n- value of 0.055, 0.061, and 0.07 for the channel			

FLOODPLAIN ROUGHNESS COEFFICIENT (ITEMS #2 and 3)

$$n = (n_b + n_1 + n_2 + n_3 + n_4)\, m$$

Where:

n_b = a base value of n for the floodplain's natural bare soil surface
n_1 = a value to correct for the effect of surface irregularities on the floodplain
n_2 = a value for variations in shape and size of the floodplain cross-section
n_3 = a value for obstructions
n_4 = a value for vegetation on the floodplain
m = a correction factor for sinuosity of the floodplain, equal to 1.0

Item 2 Floodplain Description:

Floodplain area generally defined by undeveloped land consisting of wooded tree cover and heavy plant vegetation. This floodplain item is located immediately adjacent to the channel throughout the study limits and is prominent downstream of the Interstate 55 crossing as part of the Forest Preserve property.

This n-value is applied to the portions of the floodplain located along the study limits and adjacent to the bank. This value is alo applied to the floodplain located downstream of the crossing.

Factor		Value	Description
Base Value	n_b =	0.028	Base material of channel is comprised of firm soil
Surface Irregularity	n_1 =	0.007	Moderate - floodplain has more rises and dips.
Variation in Channel Cross Section	n_2 =	0.000	Not Applicable
Obstructions	n_3 =	0.005	Minor - obstructions (debris, stumps, exposed roots, etc.) occupy less than 15 percent of the cross-sectional area.
Vegetation	n_4 =	0.050	Very Large - moderate dense brush with heavy stands of timber.
Meandering	m =	1.000	Not Applicable
Item 2: Calculated Floodplain Roughness Coefficient, n =		0.090	
Approximates the Regulatory Model n- values ranging between 0.075 and 0.09 for the floodplain.			

Item 3 Floodplain Description:

Floodplain area located along the upstream limits of the study and is comprised mainly of residental properities and open areas. The cross section is obstructed with scattered buildings and the surface is comprised of manicured lawns.

This n-value is applied to the portions of the floodplain located at the upstream limit of the study that are adjacent to the residential subdivision.

Factor		Value	Description
Base Value	n_b =	0.030	Base material of channel is comprised of firm soil
Surface Irregularity	n_1 =	0.003	Minor - floodplain with a few rises and dips visible.
Variation in Channel Cross Section	n_2 =	0.000	Not Applicable
Obstructions	n_3 =	0.012	Minor - Obstructions, such as trees, occupy less than 15 percent of the cross-sectional area.
Vegetation	n_4 =	0.010	Small - dense growths of flexible turf grass where the average depth of flow is at least two times the height of the vegetation.
Meandering	m =	1.000	Not Applicable
Item 3: Calculated Floodplain Roughness Coefficient, n =		0.055	
Is less than the Regulatory Model n- values ranging between 0.075 and 0.09 for the floodplain.			

EXHIBIT H

BRIDGE OPENING PLOTS

PLAN
SURVEYED
PLOTTED
ENGINEER CHECKED
NOTE BOOK
NO.
ALIGNMENT CHECKED
RT. OF WAY CHECKED
CADD FILE NAME
BY
DATE

℄ INTERSTATE 55

12' x 5' REINFORCED CONCRETE BOX CULVERT

STA. 430+07.77 ℄ I-55
STA. 71+70.61 ℄ EAST BRANCH SAWMILL CREEK

CONCRETE WINGWALLS

EDGE OF WATER

70+00

430+00

357.7'

43.1°

16.5'

12.0'

17.3'

12.0'

℄ EAST BRANCH SAWMILL CREEK

N. FRONTAGE ROAD

S. FRONTAGE ROAD

TENNESSEE AVENUE

75

NGVD29 DATUM

PROFILE
SURVEYED
PLOTTED
ENGINEER CHECKED
NOTE BOOK
NO.
BY
DATE
BAR. NOTED
STRUCTURE NO/ATN'S CHKD

692
690
688
686
684
682
680
678
676

TOP OF ROADWAY (N. FRONTAGE ROAD)

STA. 206.20 EL. 691.54
STA. 252.60 EL. 691.83
STA. 297.80 EL. 692.33
STA. 342.80 EL. 692.92

STA. 82.41 EL. 687.93
STA. 94.41 EL. 687.93
12.0'
MEASURED PERPENDICULAR TO FLOW

STA. 82.41 EL. 682.93
WSEL.=683.48
STA. 94.41 EL. 682.93

UPSTREAM FACE (LOOKING DOWNSTREAM)

TOP OF ROADWAY (S. FRONTAGE ROAD)

STA. 104.30 EL. 689.44
STA. 153.50 EL. 689.30
STA. 199.50 EL. 689.09
STA. 247.30 EL. 688.85

STA. 182.11 EL. 686.71
STA. 194.11 EL. 686.71
12.0'
MEASURED PERPENDICULAR TO FLOW

STA. 182.11 EL. 681.71
STA. 194.11 EL. 681.71

DOWNSTREAM FACE (LOOKING DOWNSTREAM)

SCALE:
1" = 20' HORIZONTAL
1" = 2' VERTICAL

300

FILE NAME = V:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\DIP91762\	USER NAME = cide	DESIGNED -	REVISED -
		DRAWN - dg-155.dgn	REVISED -
Default	PLOT SCALE = 20.0000 ' / in.	CHECKED -	REVISED -
	PLOT DATE = 12/11/2013	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

INTERSTATE 55 OVER EAST BRANCH SAWMILL CREEK
EXHIBIT H – EXISTING CULVERT OPENING PLOT

SCALE: | SHEET OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

EXHIBIT I

NATURAL CONDITIONS HYDRAULIC MODEL AND RESULTS

EBSamwillCreekat.rep.txt

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

****

PROJECT DATA
Project Title: EB Samwill Creek at I-55
Project File : EBSamwillCreekat.prj
Run Date and Time: 8/5/2016 11:10:31 AM

Project in English units

Project Description:
East Branch Sawmill Creek at I-55 Analysis

****

PLAN DATA

Plan Title: IND-Natural Conditions
Plan File : v:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\hec-ras\EBSamwillCreekat.p03

Geometry Title: IND-NAT Conditions
Geometry File : v:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\hec-ras\EBSamwillCreekat.g03

Flow Title : FIS_Flow Data
Flow File : v:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\hec-ras\EBSamwillCreekat.f01

Plan Description:
Independend Analysis - Natural Conditions
Surveyed Field Conditions with the
I-55 Culvert and defining sections are removed.

Plan Summary Information:
Number of: Cross Sections = 22 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

****

FLOW DATA

Flow Title: FIS_Flow Data
Flow File : v:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\hec-ras\EBSamwillCreekat.f01

Flow Data (cfs)

River	Reach	RS	10-YR	50-YR	100-YR	500-YR
Sawmill Creek	East Branch	4.810	297.7	475	565.98	775
Sawmill Creek	East Branch	4.536	324.77	520	617.38	860
Sawmill Creek	East Branch	3.920	385.63	615	732.97	1000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Sawmill Creek	East Branch	10-YR		Known WS = 678
Sawmill Creek	East Branch	50-YR		Known WS = 678.9
Sawmill Creek	East Branch	100-YR		Known WS = 679.2
Sawmill Creek	East Branch	500-YR		Known WS = 679.9

GEOMETRY DATA

Geometry Title: IND-NAT Conditions
Geometry File : v:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\hec-ras\EBSamwillCreekat.g03

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.810

INPUT
Description: FIS Section SMW11
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-330	700	-230	698	-150	696	-100	694	-24	694.1
-4	688	0	688	4	688	19	694.1	30	695
50	694	150	694	200	696	300	700		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-330	.09	-24	.075	19	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-24	19	220.75	235.75	224.5	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
30	300	695	F

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.76625*

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-247.5	698.67	-169.76	697.08	-108.22	695.52	-107.57	695.5	-68.7	693.35
-9.62	692.45	-3.06	690.27	7.13	687.25	10.13	687.25	13.13	687.25
17.54	688.82	26.64	692.83	31.27	693.78	35.87	694.16	52.65	693.59
55.87	693.62	136.57	693.77	178.53	695.35	262.45	698.5		

```
Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************************
  -247.5     .09   -9.62    .071   26.64     .09  262.45     .09

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -9.62   26.64           220.75  235.75   224.5             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.7225*

INPUT
Description:
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
    -165  697.34 -109.52  696.16  -65.61  695.03  -65.14  694.99  -37.41  692.71
    4.75   690.8   10.05  688.83   18.26   686.5   20.26   686.5   22.26   686.5
   26.18  687.65   34.27  691.57   38.02  693.01   41.73  693.33    55.3  693.18
   57.91  693.24  123.14  693.54  157.06  694.69  224.89     697

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************************
    -165     .09    4.75    .068   34.27     .09  224.89     .09

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          4.75   34.27           220.75  235.75   224.5             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.67875*

INPUT
Description:
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
   -82.5  696.02  -49.29  695.24  -22.99  694.53  -22.72  694.49   -6.11  692.06
   19.13  689.16   23.15  687.38    29.4  685.75    30.4  685.75    31.4  685.75
   34.83  686.48    41.9   690.3   44.76  692.23    47.6  692.49   57.95  692.77
   59.94  692.87  109.71  693.31  135.59  694.04  187.34   695.5

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************************
   -82.5     .09   19.13    .064    41.9     .09  187.34     .09

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         19.13    41.9           220.75  235.75   224.5             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.635

INPUT
Description: Surveyed X-Sec 60+00
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0  694.69   19.62  694.03   33.51  687.51   36.26  685.94   40.53     685
   43.47  685.31   49.54  689.04   51.51  691.46   61.97  692.49  149.79     694

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
```

```
*********************************************
       0     .09   33.51     .06   49.54     .09

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         33.51   49.54              251     246   243.5              .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.5885*

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0  693.66   12.93  692.97   16.92  692.23    28.9  686.97   32.13  684.85
   32.47  684.68   37.15  683.91   37.78   684.2   40.51  685.11   47.44  688.94
   49.39  690.16   59.76  690.73   77.97  690.97   78.38  691.05  102.23  691.81
   130.4     693  146.86     694

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************************************************
       0     .09    28.9     .06   47.44     .09   78.38    .073  146.86    .073

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          28.9   47.44              251     246   243.5              .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.542

INPUT
Description: Surveyed X-SEC 64+92.35
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0  692.63   10.87  691.76    24.3  686.44   28.39  683.49   33.77  682.81
   34.48  683.35   45.33  688.85   75.61  689.14   76.02  689.28   99.67   690.4
  127.61  692.29  143.93     694

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************************
       0     .09    24.3     .06   45.33     .09   76.02    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          24.3   45.33                15      15      15              .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.536

INPUT
Description: FIS Section SMW08
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
    -240     696    -130     692     -80     690     -20     688     -11   686.6
      -6   682.6       0   682.6       6   682.6       7   686.6      20     688
      85     690     160     694     180     696

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
    -240    .075     -11    .048       7     .07
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -11       7              172     179     172             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.504

INPUT
Description: Surveyed X-Sec 66+86.62
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0  693.15    7.34  692.26    9.57  689.46    33.6  688.03   47.45  684.96
   53.46  683.78   56.78  683.01    61.1  682.86   62.69  684.88   65.88  685.53
   89.93  687.23  118.58  688.99  153.33  691.26  176.23     694

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************************
       0     .09   47.45     .06   65.88     .09   89.93    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         47.45   65.88           302.76     297  274.79             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.449

INPUT
Description: Interpolated cross section at the U/S face of the culvert
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0  691.71   10.85  690.88   14.15  689.14   27.73  688.43   49.67  687.61
   60.32  686.52   70.14  683.14   74.25  682.53   75.47  682.28   78.41  681.61
   79.89  681.47   82.24   681.3   84.37  682.63   88.63  683.28  112.96  685.51
  127.27  686.74  141.94   687.6  163.77  688.92  177.09   689.8  200.25  692.05

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************************************************
       0     .09   70.14     .06   88.63     .09  112.96    .069  200.25    .069

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         70.14   88.63           433.24     425  393.21             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.369

INPUT
Description: Copy of Surveyed X-Sec 77+74.04 revised to eliminate scour effects
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0  689.66   40.57  687.74   88.24  686.64  102.61  680.54  105.97  680.36
  110.58  679.35   112.5  679.07  121.18  680.06  160.45   684.8  197.55  686.81
  234.63  689.25

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0     .09  102.61     .06  121.18     .09

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        102.61  121.18           165.5   182.5   129.5             .1       .3
```

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.3335*

INPUT
Description:
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	688.5	40.57	686.58	88.24	685.48	102.61	679.38	105.97	679.2
110.58	678.19	112.5	677.91	121.18	678.9	160.45	683.64	197.55	685.65
234.63	688.09								

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.073	40.57	.084	102.61	.06	121.18	.09	160.45	.073
234.63	.073								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
102.61	121.18	165.5	182.5	129.5	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.298

INPUT
Description: Surveyed X-SEC 77+74.04
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	687.34	40.57	685.42	88.24	684.32	102.61	678.22	105.97	678.04
110.58	677.03	112.5	676.75	121.18	677.74	160.45	682.48	197.55	684.49
234.63	686.93								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.055	40.57	.09	102.61	.06	121.18	.09	160.45	.055

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
102.61	121.18	407.5	233.5	120	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.254*

INPUT
Description:
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	686.48	35.64	685.11	107.35	681.7	125.39	681.94	149.34	682.37
197.47	682.11	242.48	682.02	272.73	681.97	297.96	680.29	317.14	679.03
319.43	676.3	322.31	676.36	322.53	676.44	323.49	676.73	327.11	676.39
329.93	675.93	330.75	675.81	333.01	675.56	346.12	678.83	387.45	680.92
412.85	682.28	420.2	682.53	475.89	684.18	487.51	684.56	502.77	685.23
538.9	686.26								

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.055	107.35	.087	125.39	.089	317.14	.06	346.12	.09
412.85	.073	538.9	.073						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
317.14	346.12	407.5	233.5	120	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch   RS: 4.210

INPUT
Description: Surveyed X-Sec 82+41.27
Station Elevation Data   num=   20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	685.62	59.75	683.42	179.96	677.7	250.36	679.49	331.05	679.33
406.51	679.5	499.51	679.72	531.68	679.84	534.82	674.46	538.79	674.68
540.41	675.56	545.39	675.37	550.41	674.67	553.51	674.37	571.06	679.93
629.39	681.17	675.62	682.34	770.63	684.18	792.17	684.92	843.16	685.58

Manning's n Values   num=   4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.055	179.96	.09	531.68	.06	571.06	.09

Bank Sta: Left   Right   Lengths: Left Channel   Right   Coeff Contr.   Expan.
        531.68 571.06   207.86 216.71 184.86   .1   .3
Ineffective Flow   num=   1

Sta L	Sta R	Elev	Permanent
0	250.36	679.49	F

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch   RS: 4.16857*

INPUT
Description:
Station Elevation Data   num=   27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-57.14	686.25	.28	684.03	115.82	678.46	140.92	678.88	183.48	679.76
261.04	679.45	272.97	679.45	333.56	679.43	422.95	679.4	453.87	679.43
456.68	674.76	460.24	674.87	461.69	675.59	466.16	675.33	470.66	674.64
473.44	674.32	474.44	674.32	475.44	674.32	492.77	680.23	551.4	681.81
554.31	681.85	603.08	682.77	703.33	684.15	703.7	684.16	726.05	684.89
764.62	685.48	779.85	686.21						

Manning's n Values   num=   5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-57.14	.058	115.82	.087	453.87	.059	492.77	.089	779.85	.089

Bank Sta: Left   Right   Lengths: Left Channel   Right   Coeff Contr.   Expan.
        453.87 492.77   207.86 216.71 184.86   .1   .3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch   RS: 4.12714*

INPUT
Description:
Station Elevation Data   num=   27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-114.29	686.87	-59.18	684.64	51.68	679.22	75.77	679.4	116.61	680.02
191.03	679.57	202.47	679.54	260.62	679.36	346.39	679.09	376.06	679.03
378.55	675.06	381.69	675.06	382.98	675.63	386.93	675.3	390.91	674.6
393.36	674.26	395.36	674.26	397.36	674.26	414.47	680.52	476.17	682.51
479.23	682.54	530.55	683.19	636.02	684.13	636.42	684.14	659.94	684.87
700.52	685.57	716.54	686.84						

Manning's n Values   num=   5

```
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
 -114.29    .061   51.68    .084  376.06    .059  414.47    .087  716.54    .087

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        376.06  414.47           207.86  216.71  184.86             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.08571*

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 -171.43   687.5 -118.65  685.25  -12.46  679.98   10.62  679.92   49.73  680.29
  121.01  679.69  131.98  679.63  187.67  679.28  269.83  678.77  298.25  678.62
  300.41  675.36  303.15  675.26  304.26  675.66  307.69  675.26  311.15  674.57
  313.29  674.21  316.29  674.21  319.29  674.21  336.18  680.82  400.93  683.21
  404.14  683.22  458.01  683.62  568.72   684.1  569.13  684.11  593.82  684.84
  636.41  685.65  653.23  687.47

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
 -171.43    .064  -12.46    .081  298.25    .058  336.18    .086  653.23    .086

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        298.25  336.18           207.86  216.71  184.86             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.04428*

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 -228.57  688.12 -178.11  685.85  -76.59  680.74  -54.54  680.44  -17.14  680.56
      51  679.82   61.48  679.72  114.73  679.21  193.27  678.46  220.43  678.22
  222.27  675.66   224.6  675.45  225.55   675.7  228.46  675.22   231.4  674.53
  233.22  674.16  237.22  674.16  241.22  674.16  257.88  681.11   325.7   683.9
  329.06  683.91  385.48  684.04  501.42  684.08  501.85  684.08   527.7  684.81
  572.31  685.74  589.93  688.11

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
 -228.57    .066  -76.59    .078  220.43    .057  257.88    .084  589.93    .084

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        220.43  257.88           207.86  216.71  184.86             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.00285*

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 -285.71  688.75 -237.58  686.46 -140.73   681.5 -119.69  680.96  -84.02  680.82
  -19.01  679.94   -9.01  679.82   41.78  679.14  116.71  678.14  142.62  677.81
  144.14  675.97  146.05  675.64  146.83  675.73  149.23  675.19  151.65   674.5
```

```
  153.15  674.11  158.15  674.11  163.15  674.11  179.59  681.41  250.47   684.6
  253.98  684.59  312.94  684.47  434.11  684.05  434.57  684.05  461.59  684.79
  508.21  685.83  526.62  688.74

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************************************************
 -285.71    .069 -140.73    .074  142.62    .056  179.59    .083  526.62    .083

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        142.62  179.59           207.86  216.71  184.86             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 3.96142*

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 -342.86  689.37 -297.04  687.07 -204.87  682.25 -184.85  681.48 -150.89  681.09
  -89.02  680.06  -79.51  679.91  -31.16  679.07   40.14  677.83   64.81  677.41
      66  676.27    67.5  675.83   68.12  675.77      70  675.15    71.9  674.46
   73.07  674.05   79.07  674.05   85.07  674.05  101.29   681.7  175.23   685.3
   178.9  685.28  240.41   684.9  366.81  684.03  367.28  684.03  395.47  684.76
   444.1  685.91  463.31  689.37

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************************************************
 -342.86    .072 -204.87    .071   64.81    .056  101.29    .081  463.31    .081

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         64.81  101.29           207.86  216.71  184.86             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 3.920

INPUT
Description: FIS Section SMW02
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
    -400     690    -250     682    -150     680     -13     677      -7     674
       0     674       7     674      23     682     100     686     300     684
     380     686     400     690

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
    -400    .075     -13    .055      23     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -13      23                 0       0       0             .1       .3

*********************************************************************************

SUMMARY OF MANNING'S N VALUES

River:Sawmill Creek
*************************************************************************************************
*     Reach      *   River Sta.   *   n1    *   n2    *   n3    *   n4    *   n5    *   n6    *   n7    *
*************************************************************************************************
*East Branch     *    4.810       *      .09*     .075*      .09*         *         *         *         *
*East Branch     *    4.76625*    *      .09*     .071*      .09*      .09*         *         *         *
*East Branch     *    4.7225*     *      .09*     .068*      .09*      .09*         *         *         *
*East Branch     *    4.67875*    *      .09*     .064*      .09*      .09*         *         *         *
```

*East Branch	*	4.635	*	.09*	.06*	.09*	*	*	*	*
*East Branch	*	4.5885*	*	.09*	.06*	.09*	.073*	.073*	*	*
*East Branch	*	4.542	*	.09*	.06*	.09*	.055*	*	*	*
*East Branch	*	4.536	*	.075*	.048*	.07*	*	*	*	*
*East Branch	*	4.504	*	.09*	.06*	.09*	.055*	*	*	*
*East Branch	*	4.449	*	.09*	.06*	.09*	.069*	.069*	*	*
*East Branch	*	4.369	*	.09*	.06*	.09*	*	*	*	*
*East Branch	*	4.3335*	*	.073*	.084*	.06*	.09*	.073*	.073*	*
*East Branch	*	4.298	*	.055*	.09*	.06*	.09*	.055*	*	*
*East Branch	*	4.254*	*	.055*	.087*	.089*	.06*	.09*	.073*	.073*
*East Branch	*	4.210	*	.055*	.09*	.06*	.09*	*	*	*
*East Branch	*	4.16857*	*	.058*	.087*	.059*	.089*	.089*	*	*
*East Branch	*	4.12714*	*	.061*	.084*	.059*	.087*	.087*	*	*
*East Branch	*	4.08571*	*	.064*	.081*	.058*	.086*	.086*	*	*
*East Branch	*	4.04428*	*	.066*	.078*	.057*	.084*	.084*	*	*
*East Branch	*	4.00285*	*	.069*	.074*	.056*	.083*	.083*	*	*
*East Branch	*	3.96142*	*	.072*	.071*	.056*	.081*	.081*	*	*
*East Branch	*	3.920	*	.075*	.055*	.08*	*	*	*	*

SUMMARY OF REACH LENGTHS

River: Sawmill Creek

Reach	River Sta.	Left	Channel	Right
*East Branch	4.810	220.75*	235.75*	224.5*
*East Branch	4.76625*	220.75*	235.75*	224.5*
*East Branch	4.7225*	220.75*	235.75*	224.5*
*East Branch	4.67875*	220.75*	235.75*	224.5*
*East Branch	4.635	251*	246*	243.5*
*East Branch	4.5885*	251*	246*	243.5*
*East Branch	4.542	15*	15*	15*
*East Branch	4.536	172*	179*	172*
*East Branch	4.504	302.76*	297*	274.79*
*East Branch	4.449	433.24*	425*	393.21*
*East Branch	4.369	165.5*	182.5*	129.5*
*East Branch	4.3335*	165.5*	182.5*	129.5*
*East Branch	4.298	407.5*	233.5*	120*
*East Branch	4.254*	407.5*	233.5*	120*
*East Branch	4.210	207.86*	216.71*	184.86*
*East Branch	4.16857*	207.86*	216.71*	184.86*
*East Branch	4.12714*	207.86*	216.71*	184.86*
*East Branch	4.08571*	207.86*	216.71*	184.86*
*East Branch	4.04428*	207.86*	216.71*	184.86*
*East Branch	4.00285*	207.86*	216.71*	184.86*
*East Branch	3.96142*	207.86*	216.71*	184.86*
*East Branch	3.920	0*	0*	0*

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Sawmill Creek

Reach	River Sta.	Contr.	Expan.
*East Branch	4.810	.1*	.3*
*East Branch	4.76625*	.1*	.3*
*East Branch	4.7225*	.1*	.3*
*East Branch	4.67875*	.1*	.3*
*East Branch	4.635	.1*	.3*
*East Branch	4.5885*	.1*	.3*
*East Branch	4.542	.1*	.3*
*East Branch	4.536	.1*	.3*
*East Branch	4.504	.1*	.3*
*East Branch	4.449	.1*	.3*
*East Branch	4.369	.1*	.3*
*East Branch	4.3335*	.1*	.3*
*East Branch	4.298	.1*	.3*

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*East Branch     *    4.254*  *       .1*       .3*
*East Branch     *    4.210   *       .1*       .3*
*East Branch     *    4.16857**       .1*       .3*
*East Branch     *    4.12714**       .1*       .3*
*East Branch     *    4.08571**       .1*       .3*
*East Branch     *    4.04428**       .1*       .3*
*East Branch     *    4.00285**       .1*       .3*
*East Branch     *    3.96142**       .1*       .3*
*East Branch     *    3.920   *       .1*       .3*
**************************************************
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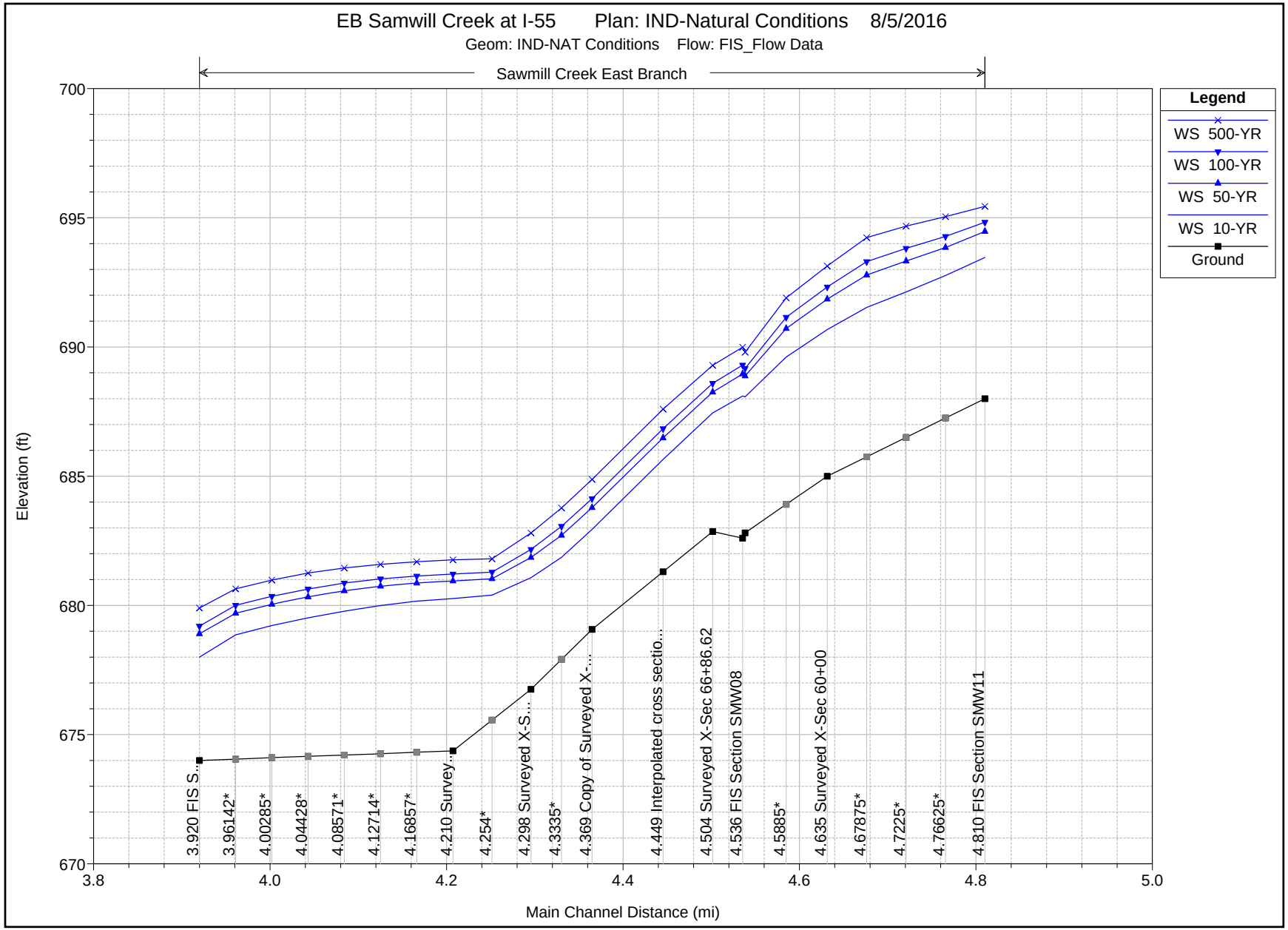

EB Samwill Creek at I-55 Plan: IND-Natural Conditions 8/5/2016
Geom: IND-NAT Conditions Flow: FIS_Flow Data
Sawmill Creek East Branch
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Elevation (ft)
Main Channel Distance (mi)
700
695
690
685
680
675
670
3.8
4.0
4.2
4.4
4.6
4.8
5.0
3.920 FIS S...
3.96142*
4.00285*
4.04428*
4.08571*
4.12714*
4.16857*
4.210 Survey...
4.254*
4.298 Surveyed X-S...
4.3335*
4.369 Copy of Surveyed X-...
4.449 Interpolated cross sectio...
4.504 Surveyed X-Sec 66+86.62
4.536 FIS Section SMW08
4.5885*
4.635 Surveyed X-Sec 60+00
4.67875*
4.7225*
4.76625*
4.810 FIS Section SMW11

HEC-RAS Plan: 03 River: Sawmill Creek Reach: East Branch

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
East Branch	4.810	10-YR	297.70	688.00	693.46	690.58	693.54	0.002943	2.30	129.27	39.34	0.22
East Branch	4.810	50-YR	475.00	688.00	694.47	691.29	694.58	0.003051	2.67	207.35	256.65	0.24
East Branch	4.810	100-YR	565.98	688.00	694.83	691.60	694.94	0.002934	2.77	257.57	285.73	0.23
East Branch	4.810	500-YR	775.00	688.00	695.44	692.21	695.50	0.001852	2.40	543.77	322.08	0.19
East Branch	4.635	10-YR	297.70	685.00	690.67	688.43	690.91	0.004123	4.01	82.24	24.09	0.34
East Branch	4.635	50-YR	475.00	685.00	691.85	689.30	692.19	0.004479	4.89	113.35	31.19	0.37
East Branch	4.635	100-YR	565.98	685.00	692.32	689.68	692.72	0.004690	5.29	129.44	36.99	0.38
East Branch	4.635	500-YR	775.00	685.00	693.13	690.44	693.65	0.005337	6.13	173.38	77.78	0.41
East Branch	4.542	10-YR	297.70	682.81	688.07	686.43	688.39	0.007871	4.54	68.06	23.61	0.44
East Branch	4.542	50-YR	475.00	682.81	688.88	687.30	689.37	0.010160	5.69	88.57	29.91	0.51
East Branch	4.542	100-YR	565.98	682.81	689.17	687.71	689.75	0.011034	6.23	102.02	58.30	0.54
East Branch	4.542	500-YR	775.00	682.81	689.80	688.47	690.49	0.011425	6.97	142.23	71.19	0.56
East Branch	4.536	10-YR	324.77	682.60	688.10	685.26	688.29	0.002211	3.58	105.01	46.39	0.29
East Branch	4.536	50-YR	520.00	682.60	688.95	686.18	689.23	0.002790	4.49	167.29	99.68	0.33
East Branch	4.536	100-YR	617.38	682.60	689.30	686.56	689.59	0.002884	4.74	205.23	121.16	0.34
East Branch	4.536	500-YR	860.00	682.60	689.99	687.71	690.30	0.002943	5.15	303.81	164.32	0.35
East Branch	4.504	10-YR	324.77	682.86	687.45	686.16	687.68	0.005936	4.20	104.39	57.27	0.40
East Branch	4.504	50-YR	520.00	682.86	688.26	686.93	688.53	0.005942	4.83	157.64	76.81	0.41
East Branch	4.504	100-YR	617.38	682.86	688.59	687.30	688.89	0.005848	5.04	185.56	88.02	0.41
East Branch	4.504	500-YR	860.00	682.86	689.29	687.89	689.60	0.005575	5.40	254.68	110.72	0.41
East Branch	4.449	10-YR	324.77	681.30	685.65	684.47	685.89	0.006252	4.29	101.60	51.72	0.41
East Branch	4.449	50-YR	520.00	681.30	686.48	685.16	686.77	0.006085	4.91	149.83	63.86	0.42
East Branch	4.449	100-YR	617.38	681.30	686.84	685.48	687.15	0.006042	5.16	173.72	71.71	0.43
East Branch	4.449	500-YR	860.00	681.30	687.60	686.07	687.94	0.005809	5.61	235.79	92.05	0.43
East Branch	4.369	10-YR	324.77	679.07	682.94	681.78	683.18	0.006656	4.34	100.20	48.09	0.43
East Branch	4.369	50-YR	520.00	679.07	683.78	682.43	684.10	0.006723	5.10	144.50	57.05	0.45
East Branch	4.369	100-YR	617.38	679.07	684.13	682.70	684.48	0.006759	5.41	165.19	60.79	0.46
East Branch	4.369	500-YR	860.00	679.07	684.87	683.31	685.29	0.006965	6.09	212.99	69.38	0.47
East Branch	4.298	10-YR	324.77	676.75	681.07	679.46	681.24	0.003937	3.65	123.11	52.91	0.34
East Branch	4.298	50-YR	520.00	676.75	681.86	680.11	682.09	0.004616	4.50	167.69	61.23	0.38
East Branch	4.298	100-YR	617.38	676.75	682.17	680.38	682.44	0.004924	4.86	187.32	64.55	0.39

HEC-RAS Plan: 03 River: Sawmill Creek Reach: East Branch (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
East Branch	4.298	500-YR	860.00	676.75	682.81	680.99	683.15	0.005535	5.61	231.23	74.65	0.43
East Branch	4.210	10-YR	324.77	674.37	680.27	676.80	680.28	0.000358	1.13	563.53	460.93	0.10
East Branch	4.210	50-YR	520.00	674.37	680.94	677.43	680.95	0.000305	1.15	890.46	506.91	0.09
East Branch	4.210	100-YR	617.38	674.37	681.21	677.71	681.22	0.000295	1.18	1030.29	525.01	0.09
East Branch	4.210	500-YR	860.00	674.37	681.77	678.32	681.78	0.000289	1.25	1329.26	558.42	0.09
East Branch	3.920	10-YR	385.63	674.00	678.00	676.52	678.26	0.005713	4.18	109.83	73.67	0.42
East Branch	3.920	50-YR	615.00	674.00	678.90	677.43	679.16	0.004987	4.46	195.44	116.57	0.40
East Branch	3.920	100-YR	732.97	674.00	679.20	677.91	679.47	0.005039	4.65	232.55	130.87	0.41
East Branch	3.920	500-YR	1000.00	674.00	679.90	678.58	680.15	0.004412	4.70	335.84	164.23	0.39

HEC-RAS Plan: 03 River: Sawmill Creek Reach: East Branch

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
East Branch	4.810	10-YR	693.54	693.46	0.08	0.69	0.00		297.70		39.34
East Branch	4.810	50-YR	694.58	694.47	0.11	0.63	0.00	17.22	457.53	0.25	256.65
East Branch	4.810	100-YR	694.94	694.83	0.11	0.56	0.01	47.57	516.95	1.47	285.73
East Branch	4.810	500-YR	695.50	695.44	0.06	0.39	0.00	104.27	512.17	158.56	322.08
East Branch	4.635	10-YR	690.91	690.67	0.24	1.07	0.00	14.34	282.63	0.74	24.09
East Branch	4.635	50-YR	692.19	691.85	0.35	1.14	0.00	34.75	437.34	2.92	31.19
East Branch	4.635	100-YR	692.72	692.32	0.40	1.19	0.01	46.83	512.44	6.71	36.99
East Branch	4.635	500-YR	693.65	693.13	0.52	1.29	0.03	75.69	674.23	25.08	77.78
East Branch	4.542	10-YR	688.39	688.07	0.32	0.06	0.04	4.09	293.61		23.61
East Branch	4.542	50-YR	689.37	688.88	0.49	0.07	0.06	13.54	461.45	0.00	29.91
East Branch	4.542	100-YR	689.75	689.17	0.58	0.07	0.09	19.15	543.91	2.91	58.30
East Branch	4.542	500-YR	690.49	689.80	0.69	0.08	0.11	33.87	700.24	40.89	71.19
East Branch	4.536	10-YR	688.29	688.10	0.19	0.61	0.00	4.92	311.94	7.91	46.39
East Branch	4.536	50-YR	689.23	688.95	0.28	0.70	0.00	24.82	459.39	35.79	99.68
East Branch	4.536	100-YR	689.59	689.30	0.29	0.71	0.00	42.92	515.02	59.44	121.16
East Branch	4.536	500-YR	690.30	689.99	0.31	0.70	0.00	102.20	623.29	134.50	164.32
East Branch	4.504	10-YR	687.68	687.45	0.23	1.79	0.00	20.24	270.21	34.32	57.27
East Branch	4.504	50-YR	688.53	688.26	0.28	1.76	0.00	39.13	382.32	98.55	76.81
East Branch	4.504	100-YR	688.89	688.59	0.29	1.74	0.00	48.73	430.41	138.24	88.02
East Branch	4.504	500-YR	689.60	689.29	0.31	1.66	0.00	82.91	530.46	246.63	110.72
East Branch	4.449	10-YR	685.89	685.65	0.24	2.71	0.00	13.38	265.18	46.21	51.72
East Branch	4.449	50-YR	686.77	686.48	0.29	2.67	0.00	28.38	379.27	112.35	63.86
East Branch	4.449	100-YR	687.15	686.84	0.31	2.67	0.00	33.92	432.75	150.71	71.71
East Branch	4.449	500-YR	687.94	687.60	0.34	2.64	0.01	55.68	549.09	255.23	92.05
East Branch	4.369	10-YR	683.18	682.94	0.24	1.09	0.01	9.77	256.25	58.75	48.09
East Branch	4.369	50-YR	684.10	683.78	0.31	1.09	0.01	21.90	381.05	117.05	57.05
East Branch	4.369	100-YR	684.48	684.13	0.34	1.09	0.01	28.89	439.25	149.25	60.79
East Branch	4.369	500-YR	685.29	684.87	0.42	1.12	0.01	48.26	578.26	233.48	69.38
East Branch	4.298	10-YR	681.24	681.07	0.16	0.71	0.01	11.92	246.12	66.73	52.91

HEC-RAS Plan: 03 River: Sawmill Creek Reach: East Branch (Continued)

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
East Branch	4.298	50-YR	682.09	681.86	0.24	0.87	0.02	24.61	368.71	126.69	61.23
East Branch	4.298	100-YR	682.44	682.17	0.27	0.93	0.02	31.66	426.72	159.00	64.55
East Branch	4.298	500-YR	683.15	682.81	0.35	1.07	0.03	50.05	558.75	251.20	74.65
East Branch	4.210	10-YR	680.28	680.27	0.01	0.09	0.00	139.61	184.90	0.26	460.93
East Branch	4.210	50-YR	680.95	680.94	0.01	0.08	0.00	296.01	219.57	4.42	506.91
East Branch	4.210	100-YR	681.22	681.21	0.01	0.07	0.00	372.90	236.27	8.21	525.01
East Branch	4.210	500-YR	681.78	681.77	0.01	0.07	0.00	561.42	277.43	21.15	558.42
East Branch	3.920	10-YR	678.26	678.00	0.26			21.54	364.09		73.67
East Branch	3.920	50-YR	679.16	678.90	0.26			111.44	503.56		116.57
East Branch	3.920	100-YR	679.47	679.20	0.27			165.60	567.37		130.87
East Branch	3.920	500-YR	680.15	679.90	0.25			323.70	676.30		164.23

Errors Warnings and Notes for Plan : 03

Location:	River: Sawmill Creek Reach: East Branch RS: 4.810 Profile: 10-YR
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.635 Profile: 10-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.5885* Profile: 10-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.542 Profile: 10-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.536 Profile: 10-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.504 Profile: 10-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.449 Profile: 10-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.369 Profile: 10-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.254* Profile: 10-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.210 Profile: 10-YR
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.12714* Profile: 10-YR
Warning:	Divided flow computed for this cross-section.
Location:	River: Sawmill Creek Reach: East Branch RS: 3.96142* Profile: 10-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.

Errors Warnings and Notes for Plan : 03

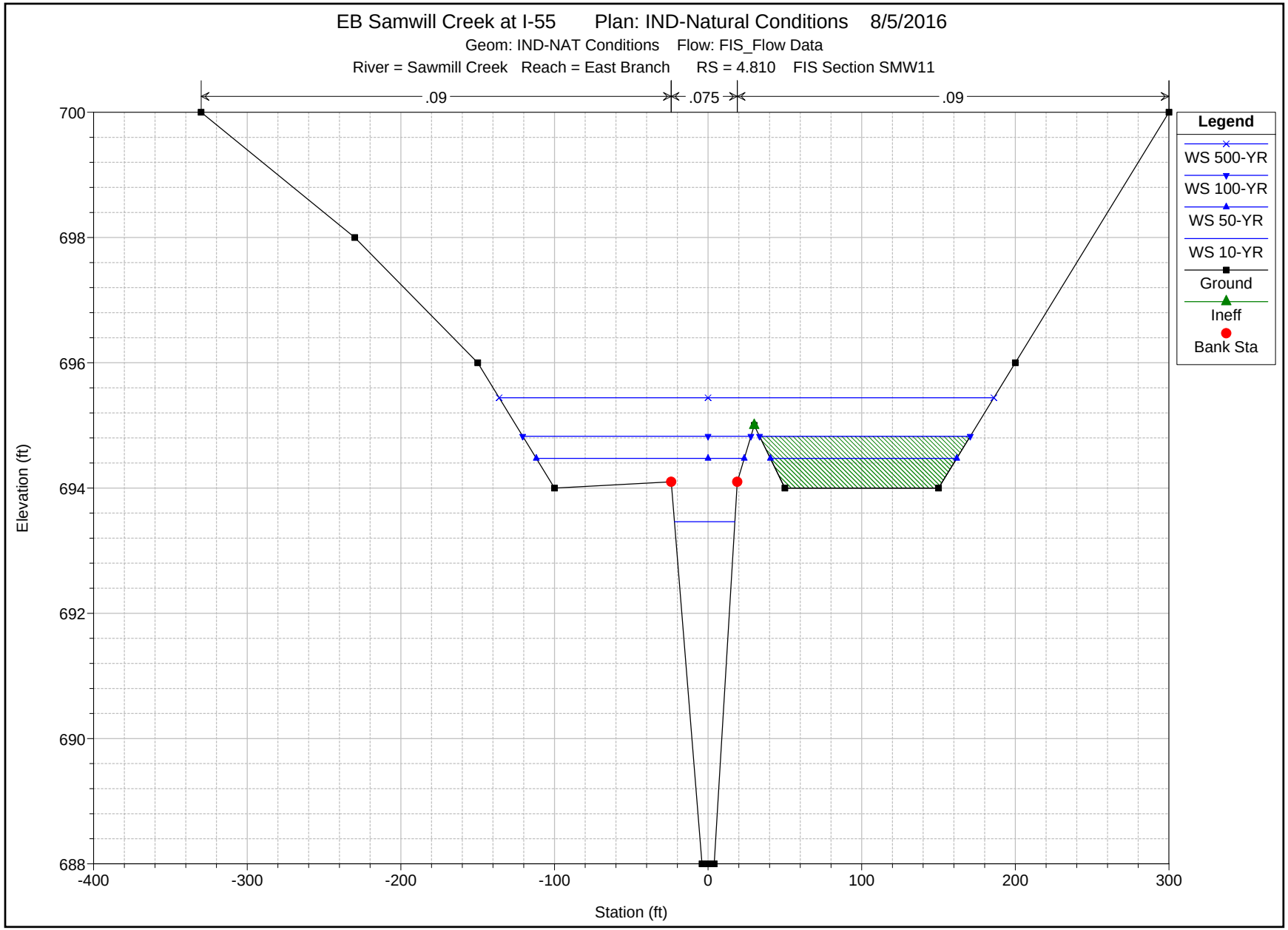
Location:	River: Sawmill Creek Reach: East Branch RS: 4.810 Profile: 50-YR
Warning:	Divided flow computed for this cross-section.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.76625* Profile: 50-YR
Warning:	Divided flow computed for this cross-section.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.7225* Profile: 50-YR
Warning:	Divided flow computed for this cross-section.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.67875* Profile: 50-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.635 Profile: 50-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.5885* Profile: 50-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.542 Profile: 50-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.536 Profile: 50-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.504 Profile: 50-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.449 Profile: 50-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.369 Profile: 50-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.254* Profile: 50-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.210 Profile: 50-YR
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 3.96142* Profile: 50-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.

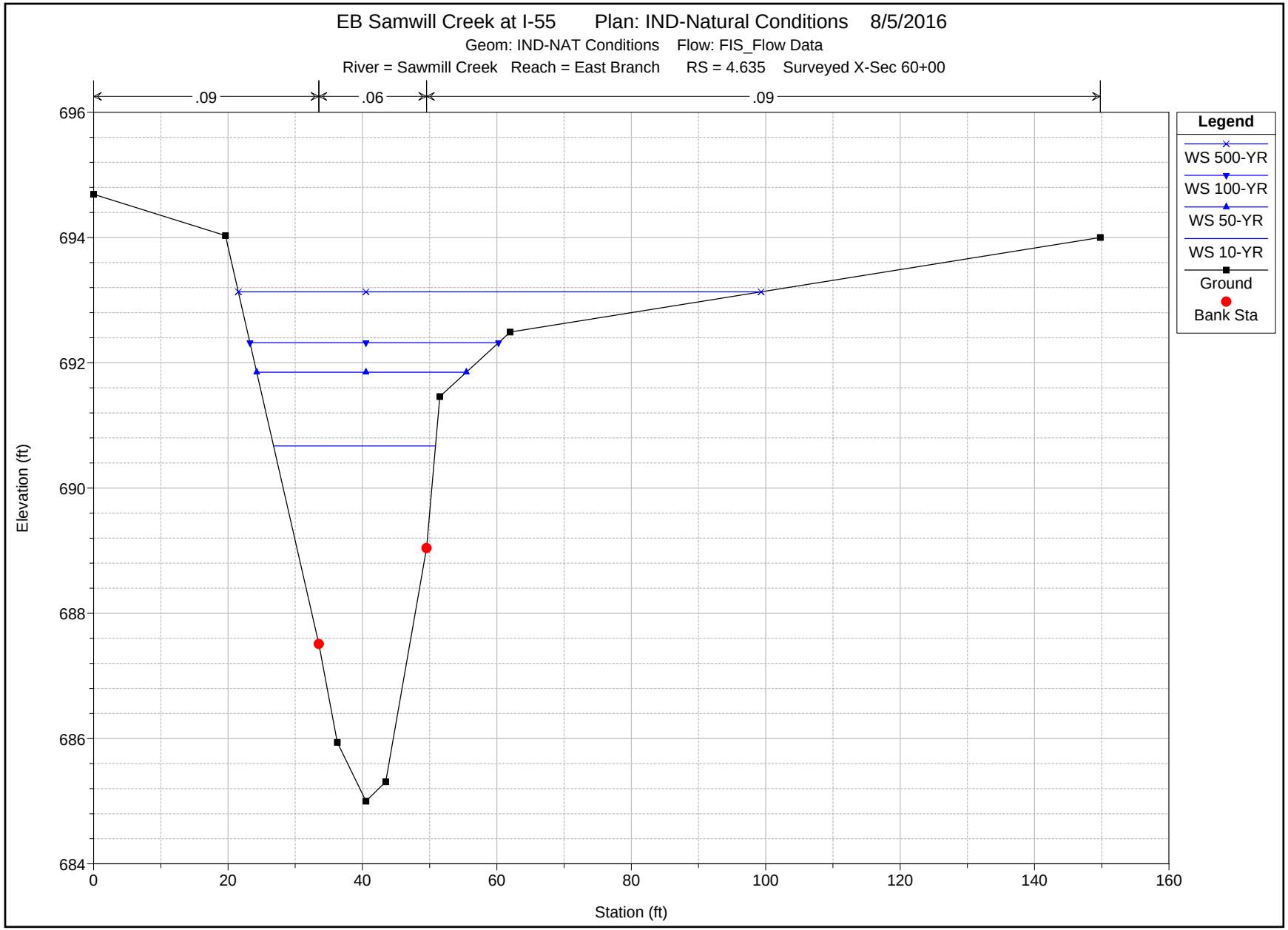
Errors Warnings and Notes for Plan : 03

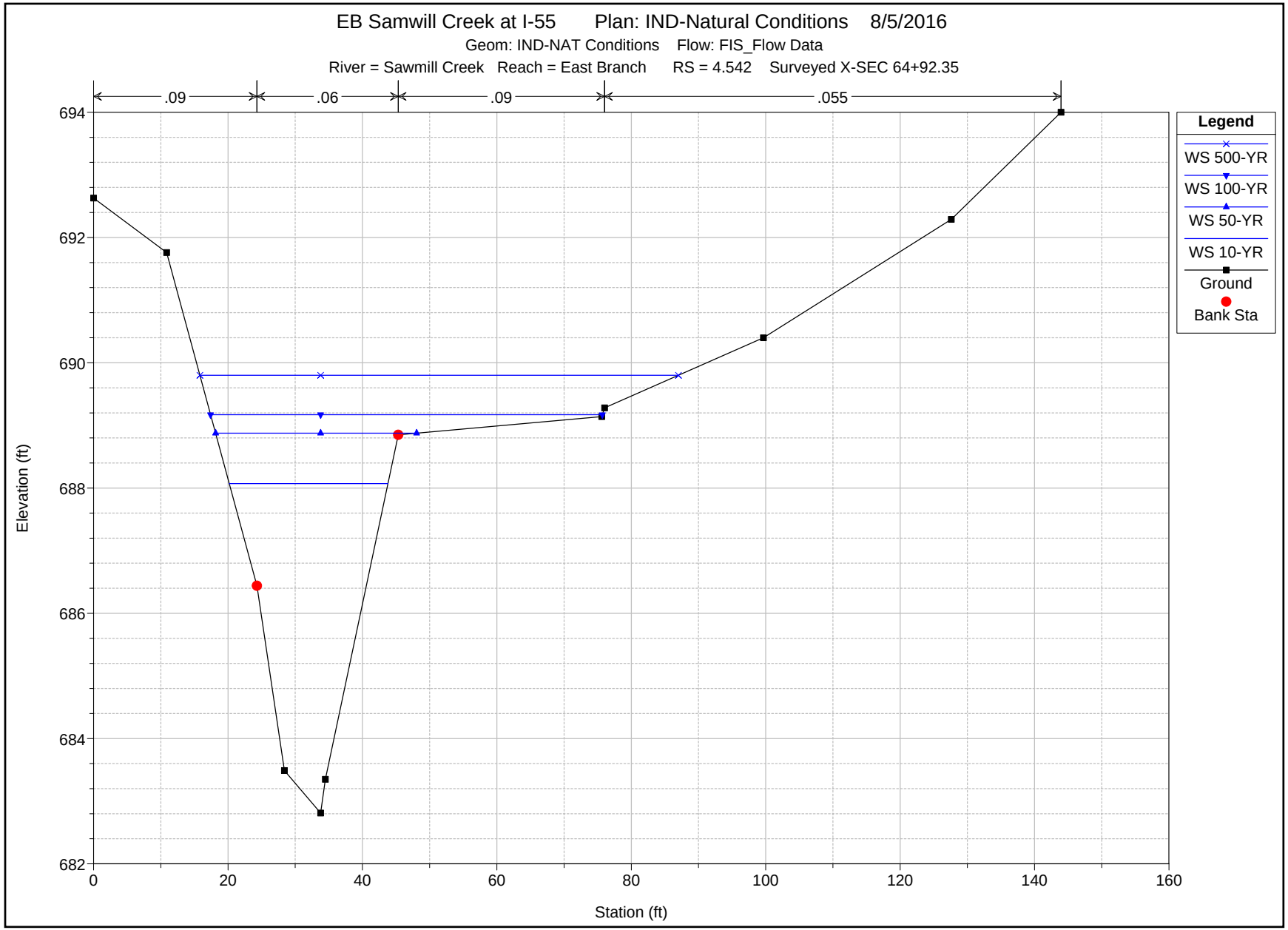
Location:	River: Sawmill Creek Reach: East Branch RS: 4.810 Profile: 100-YR
Warning:	Divided flow computed for this cross-section.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.67875* Profile: 100-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.635 Profile: 100-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.5885* Profile: 100-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.542 Profile: 100-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.536 Profile: 100-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.504 Profile: 100-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.449 Profile: 100-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.369 Profile: 100-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.254* Profile: 100-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.210 Profile: 100-YR
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 3.96142* Profile: 100-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.

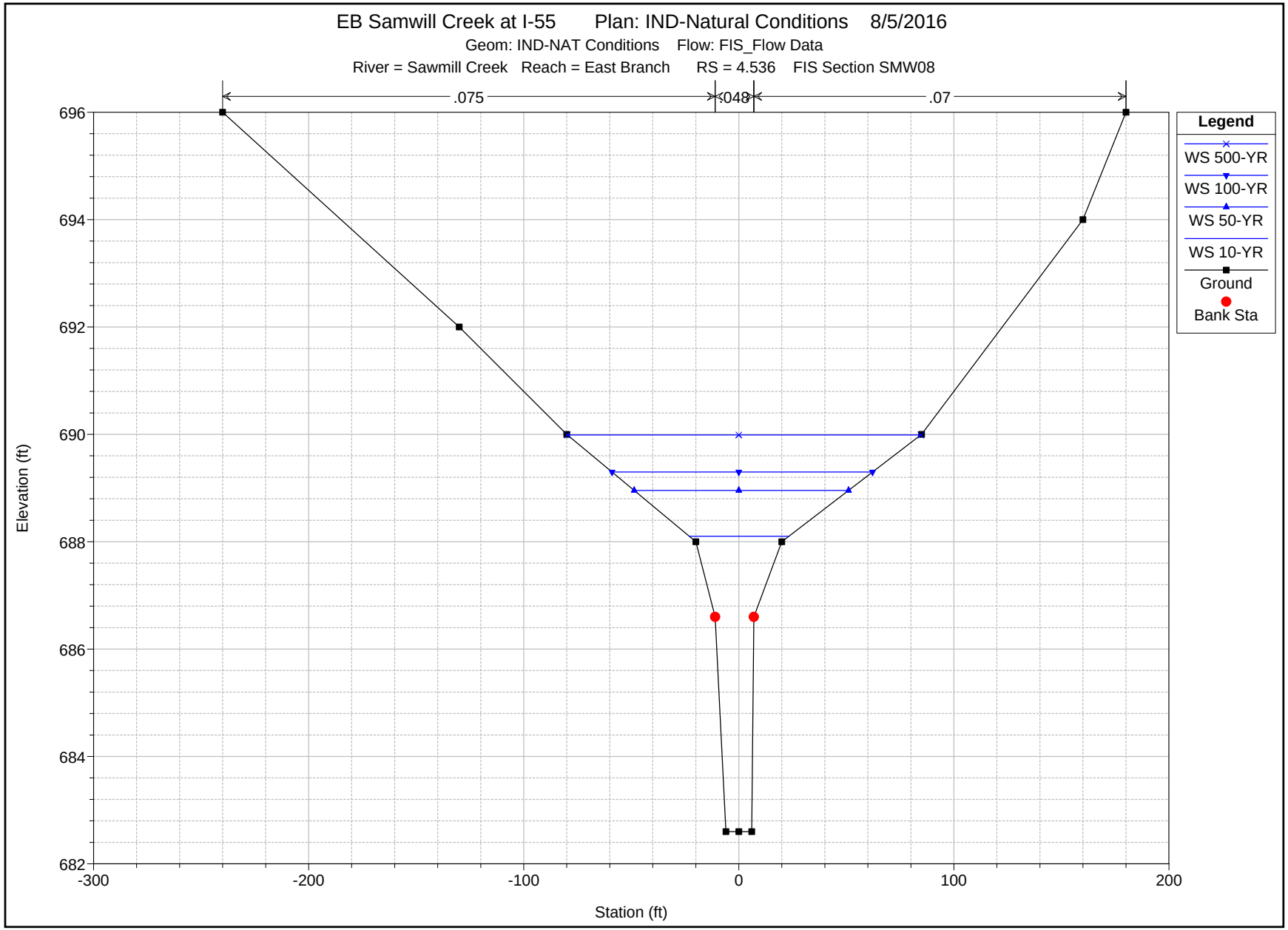
Errors Warnings and Notes for Plan : 03

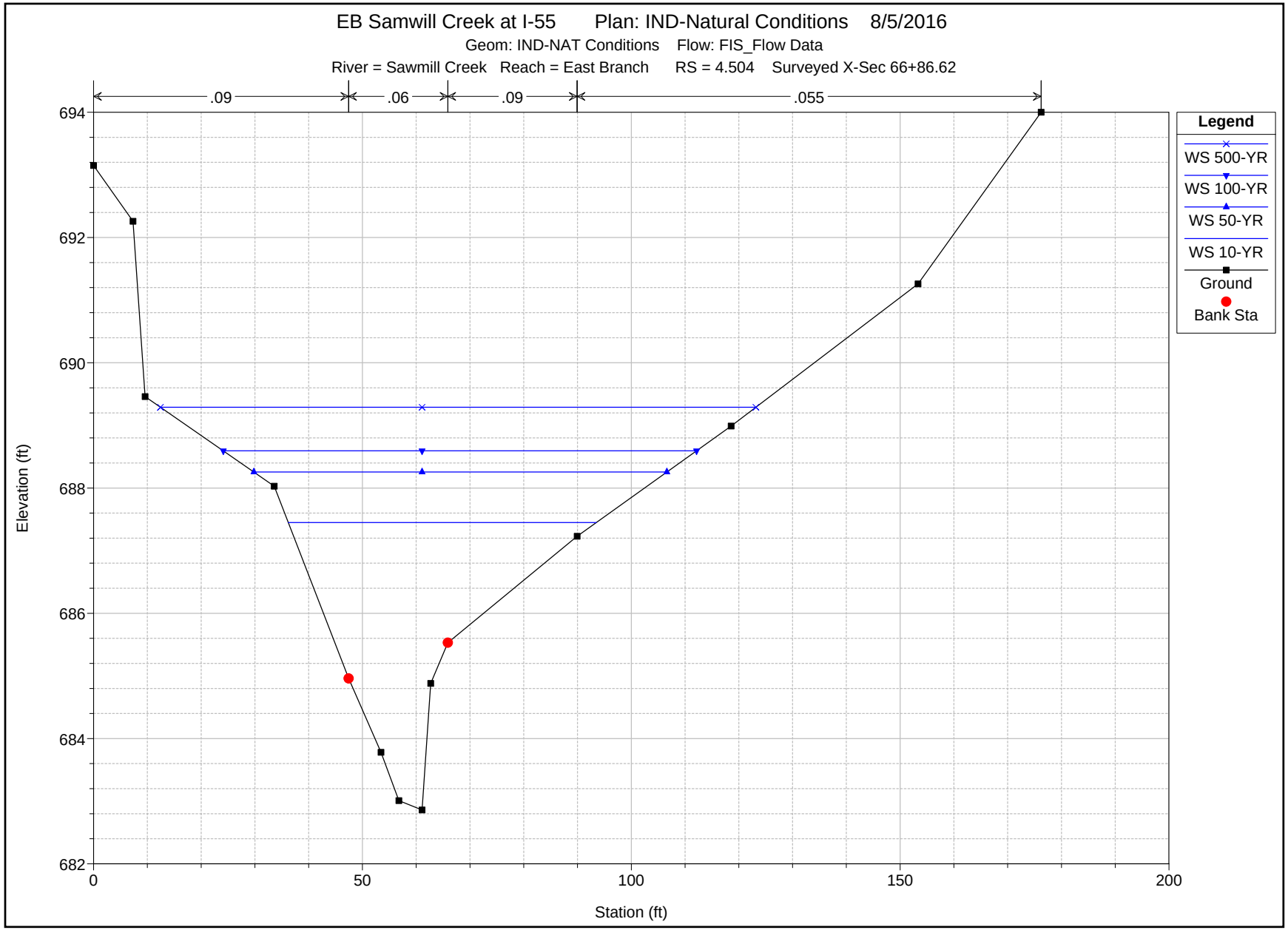
Location:	River: Sawmill Creek Reach: East Branch RS: 4.810 Profile: 500-YR
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.67875* Profile: 500-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.635 Profile: 500-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.5885* Profile: 500-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.542 Profile: 500-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.504 Profile: 500-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.449 Profile: 500-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.369 Profile: 500-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.3335* Profile: 500-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.298 Profile: 500-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.254* Profile: 500-YR
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.210 Profile: 500-YR
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

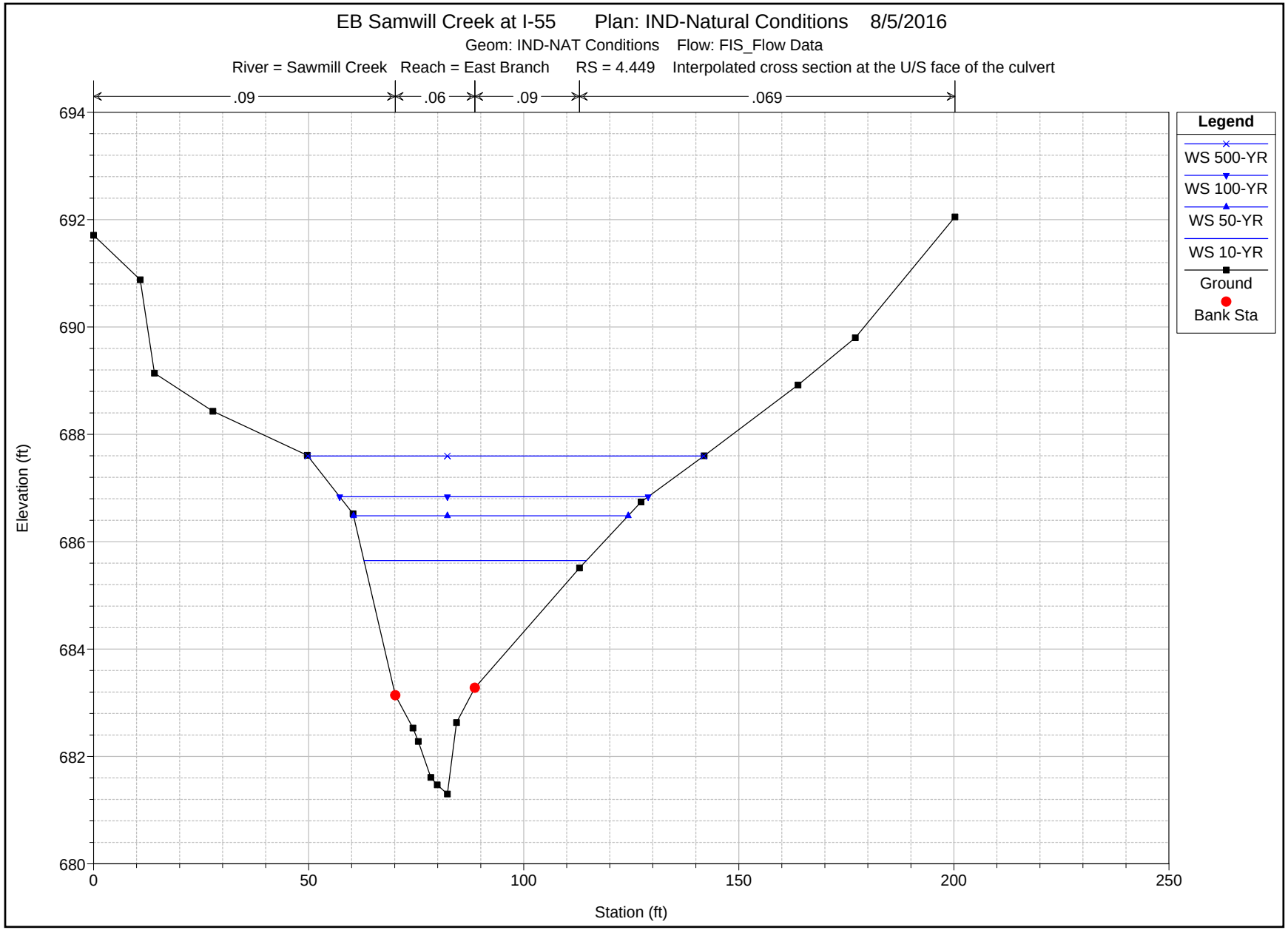

EB Samwill Creek at I-55 Plan: IND-Natural Conditions 8/5/2016
Geom: IND-NAT Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.810 FIS Section SMW11
.09
.075
.09
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Ineff
Bank Sta
Elevation (ft)
700
698
696
694
692
690
688
-400
-300
-200
-100
0
100
200
300
Station (ft)

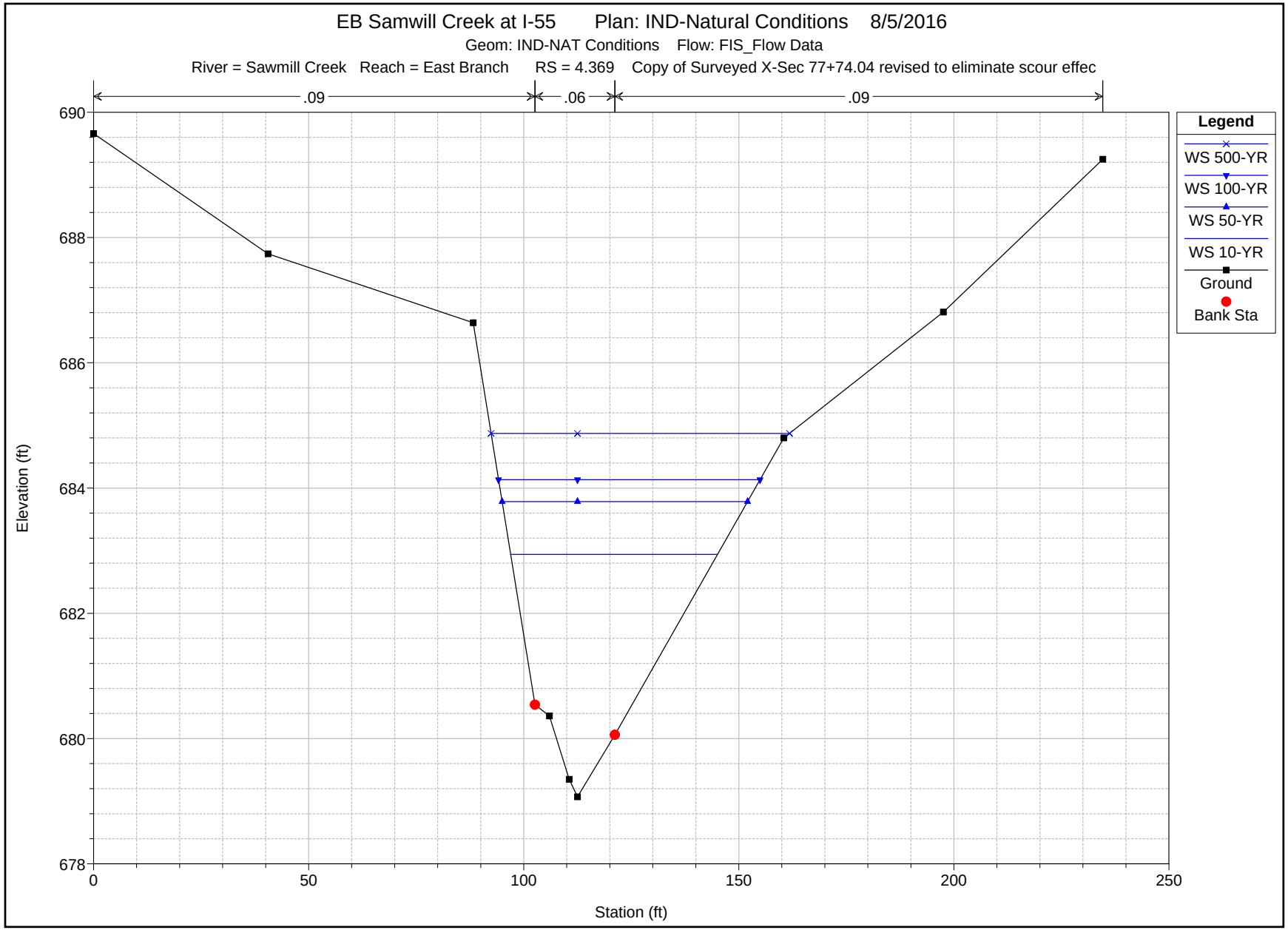

EB Samwill Creek at I-55 Plan: IND-Natural Conditions 8/5/2016
Geom: IND-NAT Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.635 Surveyed X-Sec 60+00
.09
.06
.09
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta
Elevation (ft)
696
694
692
690
688
686
684
0
20
40
60
80
100
120
140
160
Station (ft)

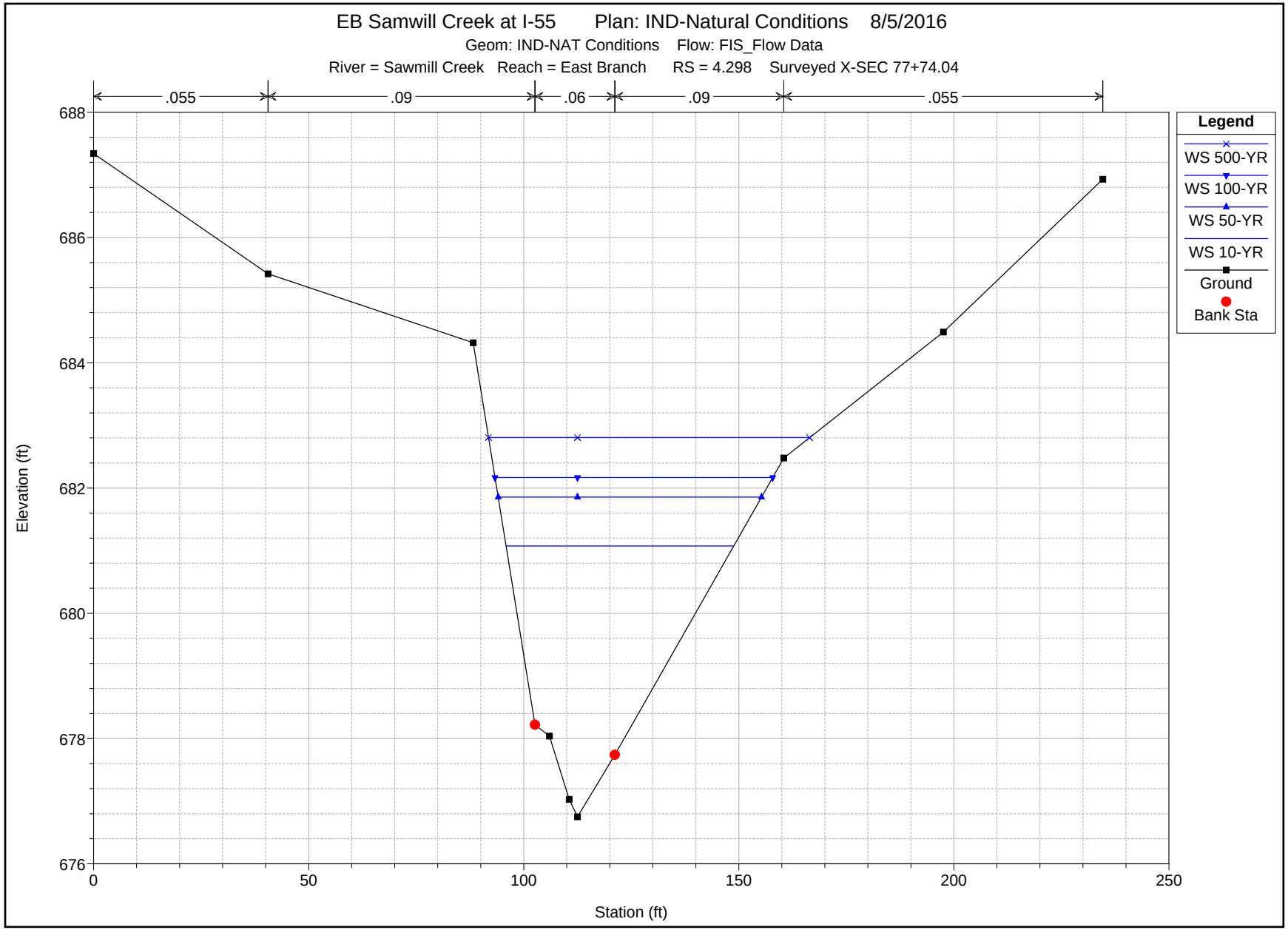

EB Samwill Creek at I-55 Plan: IND-Natural Conditions 8/5/2016
Geom: IND-NAT Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.542 Surveyed X-SEC 64+92.35
.09
.06
.09
.055
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta
Elevation (ft)
694
692
690
688
686
684
682
0
20
40
60
80
100
120
140
160
Station (ft)

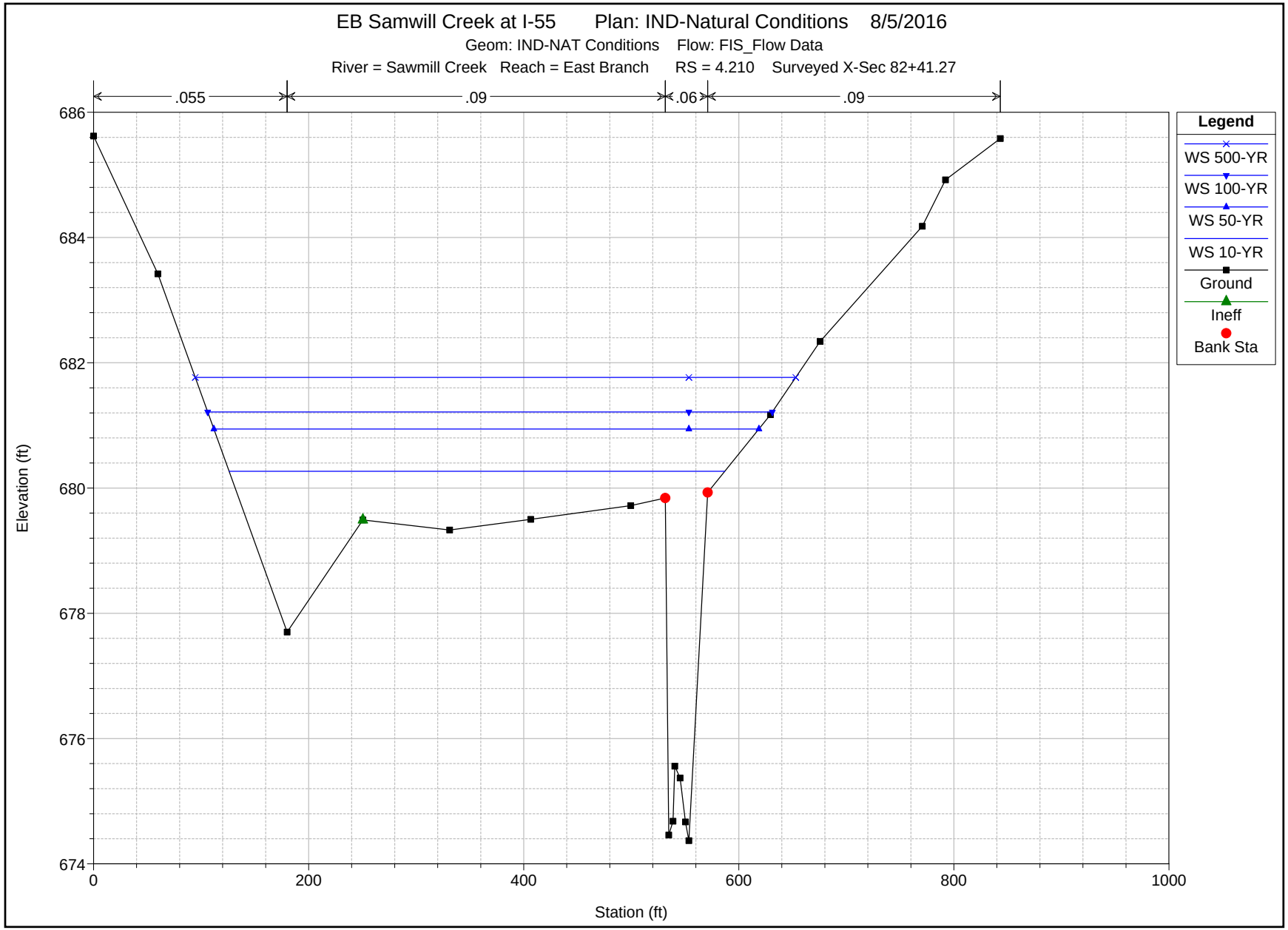

EB Samwill Creek at I-55 Plan: IND-Natural Conditions 8/5/2016
Geom: IND-NAT Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.536 FIS Section SMW08
.075
.048
.07
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta
Elevation (ft)
696
694
692
690
688
686
684
682
-300
-200
-100
0
100
200
Station (ft)


EB Samwill Creek at I-55 Plan: IND-Natural Conditions 8/5/2016
Geom: IND-NAT Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.504 Surveyed X-Sec 66+86.62
.09
.06
.09
.055
694
692
690
688
686
684
682
Elevation (ft)
0
50
100
150
200
Station (ft)
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta


EB Samwill Creek at I-55 Plan: IND-Natural Conditions 8/5/2016
Geom: IND-NAT Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.449 Interpolated cross section at the U/S face of the culvert
.09
.06
.09
.069
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta
Elevation (ft)
694
692
690
688
686
684
682
680
0
50
100
150
200
250
Station (ft)


EB Samwill Creek at I-55 Plan: IND-Natural Conditions 8/5/2016
Geom: IND-NAT Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.369 Copy of Surveyed X-Sec 77+74.04 revised to eliminate scour effec
.09
.06
.09
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta
Elevation (ft)
690
688
686
684
682
680
678
0
50
100
150
200
250
Station (ft)


EB Samwill Creek at I-55 Plan: IND-Natural Conditions 8/5/2016
Geom: IND-NAT Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.298 Surveyed X-SEC 77+74.04
.055
.09
.06
.09
.055
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta
Elevation (ft)
688
686
684
682
680
678
676
0
50
100
150
200
250
Station (ft)


EB Samwill Creek at I-55 Plan: IND-Natural Conditions 8/5/2016
Geom: IND-NAT Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.210 Surveyed X-Sec 82+41.27
.055
.09
.06
.09
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Ineff
Bank Sta
Elevation (ft)
686
684
682
680
678
676
674
0
200
400
600
800
1000
Station (ft)

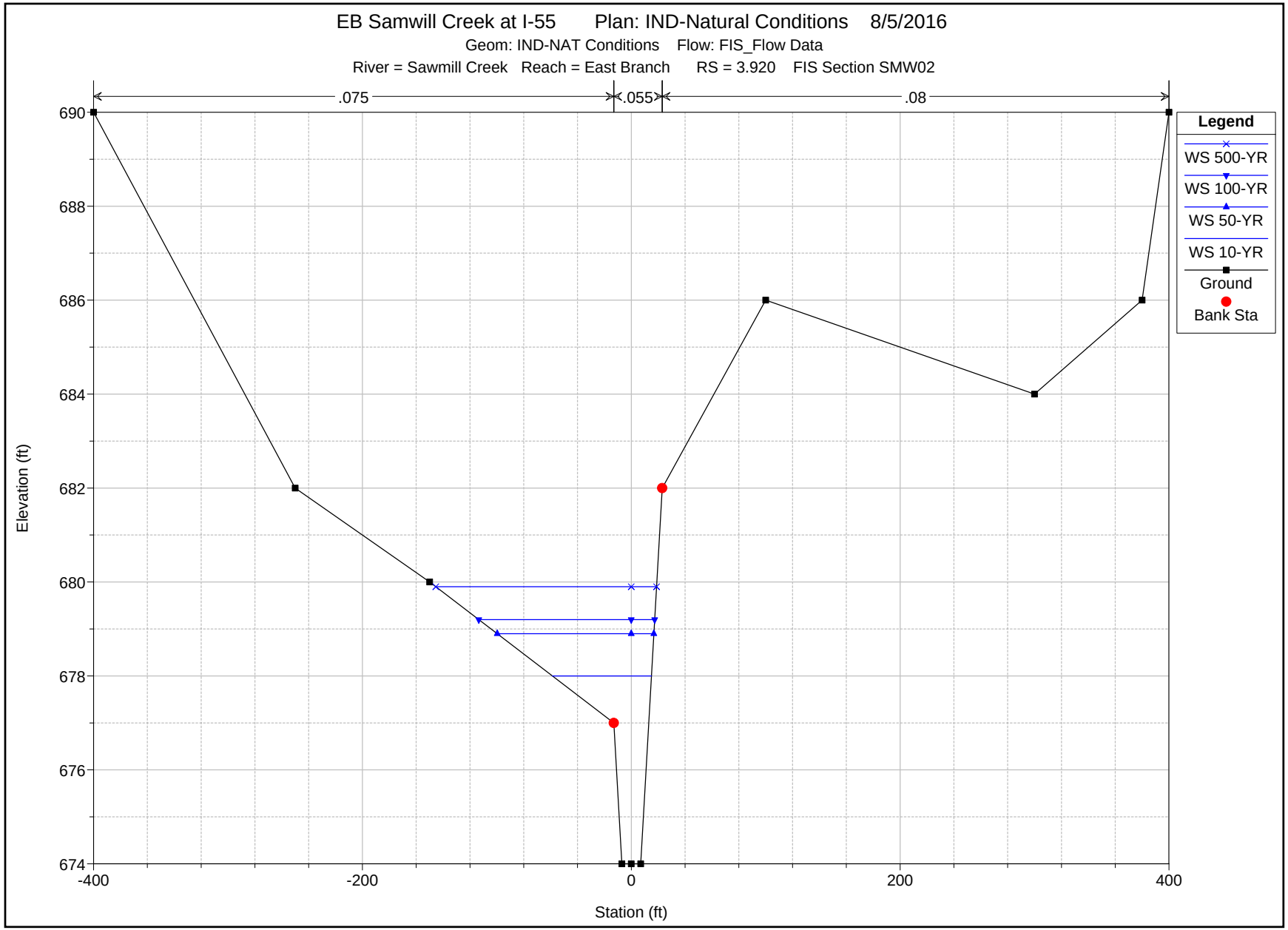

EB Samwill Creek at I-55 Plan: IND-Natural Conditions 8/5/2016
Geom: IND-NAT Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 3.920 FIS Section SMW02
.075
.055
.08
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta
Elevation (ft)
690
688
686
684
682
680
678
676
674
-400
-200
0
200
400
Station (ft)

EXHIBIT J

EXISTING CONDITIONS HYDRAULIC MODEL AND RESULTS

EBSamwillCreekat.rep

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

****

PROJECT DATA
Project Title: EB Samwill Creek at I-55
Project File : EBSamwillCreekat.prj
Run Date and Time: 8/5/2016 11:24:19 AM

Project in English units

Project Description:
East Branch Sawmill Creek at I-55 Analysis

****

PLAN DATA

Plan Title: IND-Existing Conditions
Plan File : v:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\hec-ras\EBSamwillCreekat.p02

Geometry Title: IND-EX Conditions
Geometry File : v:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\hec-ras\EBSamwillCreekat.g02

Flow Title   : FIS_Flow Data
Flow File   : v:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\hec-ras\EBSamwillCreekat.f01

Plan Description:
Surveyed Field Conditions - Existing Conditions.

Includes FEMA FIS Sections
and Surveyed Cross Sections in analysis.

WSP2 model provided by ISWS. Model
titled:
"SAWMILL CREEK TRIB TO WILLOWBROOK"
with revision date 06-01-87.

Plan Summary Information:
Number of: Cross Sections =   23   Multiple Openings =   0
            Culverts   =   1   Inline Structures =   0
            Bridges   =   0   Lateral Structures =   0

Computational Information
    Water surface calculation tolerance = 0.01
    Critical depth calculation tolerance = 0.01
    Maximum number of iterations   = 20
    Maximum difference tolerance   = 0.3
    Flow tolerance factor   = 0.001

Computation Options
    Critical depth computed at all cross sections
    Conveyance Calculation Method: At breaks in n values only

Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

****

FLOW DATA

Flow Title: FIS_Flow Data
Flow File : v:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\hec-ras\EBSamwillCreekat.f01

Flow Data (cfs)

River	Reach	RS	10-YR	50-YR	100-YR	500-YR
Sawmill Creek	East Branch	4.810	297.7	475	565.98	775
Sawmill Creek	East Branch	4.536	324.77	520	617.38	860
Sawmill Creek	East Branch	3.920	385.63	615	732.97	1000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Sawmill Creek	East Branch	10-YR		Known WS = 678
Sawmill Creek	East Branch	50-YR		Known WS = 678.9
Sawmill Creek	East Branch	100-YR		Known WS = 679.2
Sawmill Creek	East Branch	500-YR		Known WS = 679.9

****

GEOMETRY DATA

Geometry Title: IND-EX Conditions
Geometry File : v:\1786\active\178600037_IDOT_I-55\civil\drainage_east branch sawmill creek hr\hec-ras\EBSamwillCreekat.g02

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.810

INPUT
Description: FIS Section SMW11
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-330	700	-230	698	-150	696	-100	694	-24	694.1
-4	688	0	688	4	688	19	694.1	30	695
50	694	150	694	200	696	300	700		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-330	.09	-24	.075	19	.09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
-24 19 220.75 235.75 224.5 .1 .3
Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
30	300	695	F

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.76625*

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-247.5	698.67	-169.76	697.08	-108.22	695.52	-107.57	695.5	-68.7	693.35
-9.62	692.45	-3.06	690.27	7.13	687.25	10.13	687.25	13.13	687.25
17.54	688.82	26.64	692.83	31.27	693.78	35.87	694.16	52.65	693.59
55.87	693.62	136.57	693.77	178.53	695.35	262.45	698.5		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-247.5	.09	-9.62	.071	26.64	.09	262.45	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-9.62	26.64	220.75	235.75	224.5	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.7225*

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-165	697.34	-109.52	696.16	-65.61	695.03	-65.14	694.99	-37.41	692.71
4.75	690.8	10.05	688.83	18.26	686.5	20.26	686.5	22.26	686.5
26.18	687.65	34.27	691.57	38.02	693.01	41.73	693.33	55.3	693.18
57.91	693.24	123.14	693.54	157.06	694.69	224.89	697		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-165	.09	4.75	.068	34.27	.09	224.89	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
4.75	34.27	220.75	235.75	224.5	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.67875*

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-82.5	696.02	-49.29	695.24	-22.99	694.53	-22.72	694.49	-6.11	692.06
19.13	689.16	23.15	687.38	29.4	685.75	30.4	685.75	31.4	685.75
34.83	686.48	41.9	690.3	44.76	692.23	47.6	692.49	57.95	692.77
59.94	692.87	109.71	693.31	135.59	694.04	187.34	695.5		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-82.5	.09	19.13	.064	41.9	.09	187.34	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
19.13	41.9	220.75	235.75	224.5	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.635

INPUT
Description: Surveyed X-Sec 60+00
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

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```
*****************************************************************************
       0  694.69   19.62  694.03   33.51  687.51   36.26  685.94   40.53     685
   43.47  685.31   49.54  689.04   51.51  691.46   61.97  692.49  149.79     694

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************
       0     .09   33.51     .06   49.54     .09

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         33.51   49.54              251     246   243.5             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.5885*

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0  693.66   12.93  692.97   16.92  692.23    28.9  686.97   32.13  684.85
   32.47  684.68   37.15  683.91   37.78   684.2   40.51  685.11   47.44  688.94
   49.39  690.16   59.76  690.73   77.97  690.97   78.38  691.05  102.23  691.81
   130.4     693  146.86     694

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
       0     .09    28.9     .06   47.44     .09   78.38    .073  146.86    .073

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          28.9   47.44              251     246   243.5             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.542

INPUT
Description: Surveyed X-SEC 64+92.35
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0  692.63   10.87  691.76    24.3  686.44   28.39  683.49   33.77  682.81
   34.48  683.35   45.33  688.85   75.61  689.14   76.02  689.28   99.67   690.4
  127.61  692.29  143.93     694

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************************
       0     .09    24.3     .06   45.33     .09   76.02    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          24.3   45.33               15      15      15             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.536

INPUT
Description: FIS Section SMW08
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    -240     696    -130     692     -80     690     -20     688     -11   686.6
      -6   682.6       0   682.6       6   682.6       7   686.6      20     688
      85     690     160     694     180     696
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************
    -240    .075     -11    .048       7     .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -11       7              172     179     172             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.504

INPUT
Description: Surveyed X-Sec 66+86.62
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0  693.15    7.34  692.26    9.57  689.46    33.6  688.03   47.45  684.96
   53.46  683.78   56.78  683.01    61.1  682.86   62.69  684.88   65.88  685.53
   89.93  687.23  118.58  688.99  153.33  691.26  176.23     694

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************************
       0     .09   47.45     .06   65.88     .09   89.93    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         47.45   65.88              302     297     280             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.449

INPUT
Description: Surveyed X-SEC 69+83.28 - U/S Face of Culvert
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0     694   20.19     693   53.62     692  113.12     691  286.39  690.61
  358.71  691.23  364.04  689.37  365.52  682.91   374.8  681.07  382.16  682.43
  392.56  687.01  394.94  687.29  502.55     690   599.9     692   637.5     694

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0     .09  358.71     .06  392.56    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        358.71  392.56              320     375     368             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   361.8  691.24       T
   387.8   637.5  691.24       T

CULVERT


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.413

INPUT
Description: Culvert Carrying I-55 over East Branch of Sawmill Creek
Distance from Upstream XS =      15
Deck/Roadway Width        =     340
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=      17
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
```

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-29.4	696.28	.5	695.28	31.4	694.28
67.6	693.28	122.6	692.28	134	692.13
182.8	691.42	199.8	691.49	278	691.24
323.2	691.54	369.7	691.83	414.8	692.33
459.8	692.92	507.5	693.74	548.6	694.28
596.5	695.28	667.4	696.28		

Upstream Bridge Cross Section Data
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	694	20.19	693	53.62	692	113.12	691	286.39	690.61
358.71	691.23	364.04	689.37	365.52	682.91	374.8	681.07	382.16	682.43
392.56	687.01	394.94	687.29	502.55	690	599.9	692	637.5	694

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.09	358.71	.06	392.56	.055

Bank Sta: Left Right Coeff Contr. Expan.
358.71 392.56 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	361.8	691.24	T
387.8	637.5	691.24	T

Downstream Deck/Roadway Coordinates
num= 11

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-29.4	689.44		19.9	689.44		69	689.31	
115.1	689.09		162.9	688.85		207.6	688.76	
258.7	688.66		308.8	688.63		357.2	688.86	
400.6	689.06		449.6	689.19				

Downstream Bridge Cross Section Data
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-115.8	692.28	-64.8	690.28	-23.5	689.28	0	689.02	8.52	687.82
16.74	687.22	21.67	686.26	26.56	686.25	32.32	687.18	34.21	687.36
46.72	687.71	56.92	687.41	63.43	685.77	67.6	685.66	74.25	685.95
98.29	685.18	154.7	684.2	169.77	682.84	177.7	678.86	188.11	677.67
196.63	678.66	197.54	687.94	200.43	688.13	204.79	688.63	247.3	688.85
295.3	688.76	343.1	688.66	393.2	688.63	441.6	688.86	485	689.06
534.1	689.19	557.6	689.28						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-115.8	.09	169.77	.06	197.54	.09

Bank Sta: Left Right Coeff Contr. Expan.
169.77 197.54 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-115.8	180.11	686.75	T
196.11	557.6	686.75	T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 691.1
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Box	5	12

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FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	8	359.6	.013	.013	0	.4	1

Upstream Elevation = 682.93
Centerline Station = 374.8
Downstream Elevation = 681.71
Centerline Station = 188.11

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.378

INPUT
Description: Surveyed X-Sec 73+58.47 - D/S Face of Culvert
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-115.8	692.28	-64.8	690.28	-23.5	689.28	0	689.02	8.52	687.82
16.74	687.22	21.67	686.26	26.56	686.25	32.32	687.18	34.21	687.36
46.72	687.71	56.92	687.41	63.43	685.77	67.6	685.66	74.25	685.95
98.29	685.18	154.7	684.2	169.77	682.84	177.7	678.86	188.11	677.67
196.63	678.66	197.54	687.94	200.43	688.13	204.79	688.63	247.3	688.85
295.3	688.76	343.1	688.66	393.2	688.63	441.6	688.86	485	689.06
534.1	689.19	557.6	689.28						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-115.8	.09	169.77	.06	197.54	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
169.77	197.54	114	50	20	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-115.8	180.11	686.75	T
196.11	557.6	686.75	T

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.369

INPUT
Description: Copy of Surveyed X-Sec 73+58.47 - D/S Face of Culvert
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-115.8	692.28	-64.8	690.28	-23.5	689.28	0	689.02	8.52	687.82
16.74	687.22	21.67	686.26	26.56	686.25	32.32	687.18	34.21	687.36
46.72	687.71	56.92	687.41	63.43	685.77	67.6	685.66	74.25	685.95
98.29	685.18	154.7	684.2	169.77	682.84	177.7	680	188.11	679.07
196.63	680	197.54	687.94	200.43	688.13	204.79	688.63	247.3	688.85
295.3	688.76	343.1	688.66	393.2	688.63	441.6	688.86	485	689.06
534.1	689.19	557.6	689.28						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-115.8	.09	169.77	.06	197.54	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
169.77	197.54	165.5	182.5	129.5	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-115.8	167	686.75	T
209	557.6	686.75	T

CROSS SECTION

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RIVER: Sawmill Creek
REACH: East Branch RS: 4.3335*

INPUT
Description:
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-57.9	689.81	-23.24	688.38	4.83	687.53	18.84	687.24	20.8	687.21
26.6	686.57	32.18	686.24	35.53	685.74	38.86	685.71	42.77	686.15
44.06	686.24	52.56	686.36	59.49	686.17	63.92	685.32	66.75	685.25
71.27	685.37	87.61	684.88	109.01	684.48	125.95	682.36	136.19	680.53
140.99	679.32	142.29	678.92	147.56	678.21	150.3	677.91	158.49	678.82
159.36	682.84	161.26	682.99	164.13	683.32	192.08	684.24	223.64	685.11
241.31	685.59	255.07	685.75	288.01	686.16	318.73	686.67	319.84	686.69
348.38	687.24	380.66	687.82	396.11	688.1				

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-57.9	.073	18.84	.084	136.19	.06	159.36	.09	241.31	.073
396.11	.073								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
136.19	159.36	165.5	182.5	129.5	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.298

INPUT
Description: Surveyed X-SEC 77+74.04
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	687.34	40.57	685.42	88.24	684.32	102.61	678.22	105.97	678.04
110.58	677.03	112.5	676.75	121.18	677.74	160.45	682.48	197.55	684.49
234.63	686.93								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.055	40.57	.09	102.61	.06	121.18	.09	160.45	.055

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
102.61	121.18	407.5	233.5	120	.1	.3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 4.254*

INPUT
Description:
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	686.48	35.64	685.11	107.35	681.7	125.39	681.94	149.34	682.37
197.47	682.11	242.48	682.02	272.73	681.97	297.96	680.29	317.14	679.03
319.43	676.3	322.31	676.36	322.53	676.44	323.49	676.73	327.11	676.39
329.93	675.93	330.75	675.81	333.01	675.56	346.12	678.83	387.45	680.92
412.85	682.28	420.2	682.53	475.89	684.18	487.51	684.56	502.77	685.23
538.9	686.26								

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.055	107.35	.087	125.39	.089	317.14	.06	346.12	.09

```
  412.85    .073   538.9    .073

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        317.14  346.12            407.5   233.5     120             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.210

INPUT
Description: Surveyed X-Sec 82+41.27
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0  685.62   59.75  683.42  179.96   677.7  250.36  679.49  331.05  679.33
  406.51   679.5  499.51  679.72  531.68  679.84  534.82  674.46  538.79  674.68
  540.41  675.56  545.39  675.37  550.41  674.67  553.51  674.37  571.06  679.93
  629.39  681.17  675.62  682.34  770.63  684.18  792.17  684.92  843.16  685.58

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************************
       0    .055  179.96     .09  531.68     .06  571.06     .09

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        531.68  571.06          207.86  216.71  184.86             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0  250.36  679.49       F

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.16857*

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
  -57.14  686.25     .28  684.03  115.82  678.46  140.92  678.88  183.48  679.76
  261.04  679.45  272.97  679.45  333.56  679.43  422.95   679.4  453.87  679.43
  456.68  674.76  460.24  674.87  461.69  675.59  466.16  675.33  470.66  674.64
  473.44  674.32  474.44  674.32  475.44  674.32  492.77  680.23   551.4  681.81
  554.31  681.85  603.08  682.77  703.33  684.15   703.7  684.16  726.05  684.89
  764.62  685.48  779.85  686.21

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************************************************
  -57.14    .058  115.82    .087  453.87    .059  492.77    .089  779.85    .089

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        453.87  492.77          207.86  216.71  184.86             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.12714*

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
 -114.29  686.87  -59.18  684.64   51.68  679.22   75.77   679.4  116.61  680.02
  191.03  679.57  202.47  679.54  260.62  679.36  346.39  679.09  376.06  679.03
  378.55  675.06  381.69  675.06  382.98  675.63  386.93   675.3  390.91   674.6
  393.36  674.26  395.36  674.26  397.36  674.26  414.47  680.52  476.17  682.51
```

```
  479.23  682.54  530.55  683.19  636.02  684.13  636.42  684.14  659.94  684.87
  700.52  685.57  716.54  686.84

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************************************************
 -114.29    .061   51.68    .084  376.06    .059  414.47    .087  716.54    .087

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        376.06  414.47           207.86  216.71  184.86             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.08571*

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 -171.43   687.5 -118.65  685.25  -12.46  679.98   10.62  679.92   49.73  680.29
  121.01  679.69  131.98  679.63  187.67  679.28  269.83  678.77  298.25  678.62
  300.41  675.36  303.15  675.26  304.26  675.66  307.69  675.26  311.15  674.57
  313.29  674.21  316.29  674.21  319.29  674.21  336.18  680.82  400.93  683.21
  404.14  683.22  458.01  683.62  568.72   684.1  569.13  684.11  593.82  684.84
  636.41  685.65  653.23  687.47

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************************************************
 -171.43    .064  -12.46    .081  298.25    .058  336.18    .086  653.23    .086

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        298.25  336.18           207.86  216.71  184.86             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.04428*

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 -228.57  688.12 -178.11  685.85  -76.59  680.74  -54.54  680.44  -17.14  680.56
      51  679.82   61.48  679.72  114.73  679.21  193.27  678.46  220.43  678.22
  222.27  675.66   224.6  675.45  225.55   675.7  228.46  675.22   231.4  674.53
  233.22  674.16  237.22  674.16  241.22  674.16  257.88  681.11   325.7   683.9
  329.06  683.91  385.48  684.04  501.42  684.08  501.85  684.08   527.7  684.81
  572.31  685.74  589.93  688.11

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************************************************
 -228.57    .066  -76.59    .078  220.43    .057  257.88    .084  589.93    .084

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        220.43  257.88           207.86  216.71  184.86             .1       .3

CROSS SECTION


RIVER: Sawmill Creek
REACH: East Branch        RS: 4.00285*

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

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-285.71	688.75	-237.58	686.46	-140.73	681.5	-119.69	680.96	-84.02	680.82
-19.01	679.94	-9.01	679.82	41.78	679.14	116.71	678.14	142.62	677.81
144.14	675.97	146.05	675.64	146.83	675.73	149.23	675.19	151.65	674.5
153.15	674.11	158.15	674.11	163.15	674.11	179.59	681.41	250.47	684.6
253.98	684.59	312.94	684.47	434.11	684.05	434.57	684.05	461.59	684.79
508.21	685.83	526.62	688.74						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-285.71	.069	-140.73	.074	142.62	.056	179.59	.083	526.62	.083

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
142.62	179.59	207.86	216.71	184.86	.1 .3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 3.96142*

INPUT
Description:
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-342.86	689.37	-297.04	687.07	-204.87	682.25	-184.85	681.48	-150.89	681.09
-89.02	680.06	-79.51	679.91	-31.16	679.07	40.14	677.83	64.81	677.41
66	676.27	67.5	675.83	68.12	675.77	70	675.15	71.9	674.46
73.07	674.05	79.07	674.05	85.07	674.05	101.29	681.7	175.23	685.3
178.9	685.28	240.41	684.9	366.81	684.03	367.28	684.03	395.47	684.76
444.1	685.91	463.31	689.37						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-342.86	.072	-204.87	.071	64.81	.056	101.29	.081	463.31	.081

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
64.81	101.29	207.86	216.71	184.86	.1 .3

CROSS SECTION

RIVER: Sawmill Creek
REACH: East Branch RS: 3.920

INPUT
Description: FIS Section SMW02
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-400	690	-250	682	-150	680	-13	677	-7	674
0	674	7	674	23	682	100	686	300	684
380	686	400	690						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-400	.075	-13	.055	23	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-13	23	0	0	0	.1 .3

SUMMARY OF MANNING'S N VALUES

River:Sawmill Creek

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7

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*East Branch	*	4.810	*	.09*	.075*	.09*	*	*	*	*
*East Branch	*	4.76625*	*	.09*	.071*	.09*	.09*	*	*	*
*East Branch	*	4.7225*	*	.09*	.068*	.09*	.09*	*	*	*
*East Branch	*	4.67875*	*	.09*	.064*	.09*	.09*	*	*	*
*East Branch	*	4.635	*	.09*	.06*	.09*	*	*	*	*
*East Branch	*	4.5885*	*	.09*	.06*	.09*	.073*	.073*	*	*
*East Branch	*	4.542	*	.09*	.06*	.09*	.055*	*	*	*
*East Branch	*	4.536	*	.075*	.048*	.07*	*	*	*	*
*East Branch	*	4.504	*	.09*	.06*	.09*	.055*	*	*	*
*East Branch	*	4.449	*	.09*	.06*	.055*	*	*	*	*
*East Branch	*	4.413	*Culvert	*	*	*	*	*	*	*
*East Branch	*	4.378	*	.09*	.06*	.09*	*	*	*	*
*East Branch	*	4.369	*	.09*	.06*	.09*	*	*	*	*
*East Branch	*	4.3335*	*	.073*	.084*	.06*	.09*	.073*	.073*	*
*East Branch	*	4.298	*	.055*	.09*	.06*	.09*	.055*	*	*
*East Branch	*	4.254*	*	.055*	.087*	.089*	.06*	.09*	.073*	.073*
*East Branch	*	4.210	*	.055*	.09*	.06*	.09*	*	*	*
*East Branch	*	4.16857*	*	.058*	.087*	.059*	.089*	.089*	*	*
*East Branch	*	4.12714*	*	.061*	.084*	.059*	.087*	.087*	*	*
*East Branch	*	4.08571*	*	.064*	.081*	.058*	.086*	.086*	*	*
*East Branch	*	4.04428*	*	.066*	.078*	.057*	.084*	.084*	*	*
*East Branch	*	4.00285*	*	.069*	.074*	.056*	.083*	.083*	*	*
*East Branch	*	3.96142*	*	.072*	.071*	.056*	.081*	.081*	*	*
*East Branch	*	3.920	*	.075*	.055*	.08*	*	*	*	*

SUMMARY OF REACH LENGTHS

River: Sawmill Creek

Reach	River Sta.	Left	Channel	Right
*East Branch	4.810	220.75*	235.75*	224.5*
*East Branch	4.76625*	220.75*	235.75*	224.5*
*East Branch	4.7225*	220.75*	235.75*	224.5*
*East Branch	4.67875*	220.75*	235.75*	224.5*
*East Branch	4.635	251*	246*	243.5*
*East Branch	4.5885*	251*	246*	243.5*
*East Branch	4.542	15*	15*	15*
*East Branch	4.536	172*	179*	172*
*East Branch	4.504	302*	297*	280*
*East Branch	4.449	320*	375*	368*
*East Branch	4.413	*Culvert	*	*
*East Branch	4.378	114*	50*	20*
*East Branch	4.369	165.5*	182.5*	129.5*
*East Branch	4.3335*	165.5*	182.5*	129.5*
*East Branch	4.298	407.5*	233.5*	120*
*East Branch	4.254*	407.5*	233.5*	120*
*East Branch	4.210	207.86*	216.71*	184.86*
*East Branch	4.16857*	207.86*	216.71*	184.86*
*East Branch	4.12714*	207.86*	216.71*	184.86*
*East Branch	4.08571*	207.86*	216.71*	184.86*
*East Branch	4.04428*	207.86*	216.71*	184.86*
*East Branch	4.00285*	207.86*	216.71*	184.86*
*East Branch	3.96142*	207.86*	216.71*	184.86*
*East Branch	3.920	0*	0*	0*

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Sawmill Creek

Reach	River Sta.	Contr.	Expan.
*East Branch	4.810	.1*	.3*
*East Branch	4.76625*	.1*	.3*
*East Branch	4.7225*	.1*	.3*
*East Branch	4.67875*	.1*	.3*
*East Branch	4.635	.1*	.3*

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*East Branch     *    4.5885* *       .1*       .3*
*East Branch     *    4.542   *       .1*       .3*
*East Branch     *    4.536   *       .1*       .3*
*East Branch     *    4.504   *       .1*       .3*
*East Branch     *    4.449   *       .3*       .5*
*East Branch     *    4.413   *Culvert  *         *
*East Branch     *    4.378   *       .3*       .5*
*East Branch     *    4.369   *       .1*       .3*
*East Branch     *    4.3335* *       .1*       .3*
*East Branch     *    4.298   *       .1*       .3*
*East Branch     *    4.254*  *       .1*       .3*
*East Branch     *    4.210   *       .1*       .3*
*East Branch     *    4.16857**       .1*       .3*
*East Branch     *    4.12714**       .1*       .3*
*East Branch     *    4.08571**       .1*       .3*
*East Branch     *    4.04428**       .1*       .3*
*East Branch     *    4.00285**       .1*       .3*
*East Branch     *    3.96142**       .1*       .3*
*East Branch     *    3.920   *       .1*       .3*
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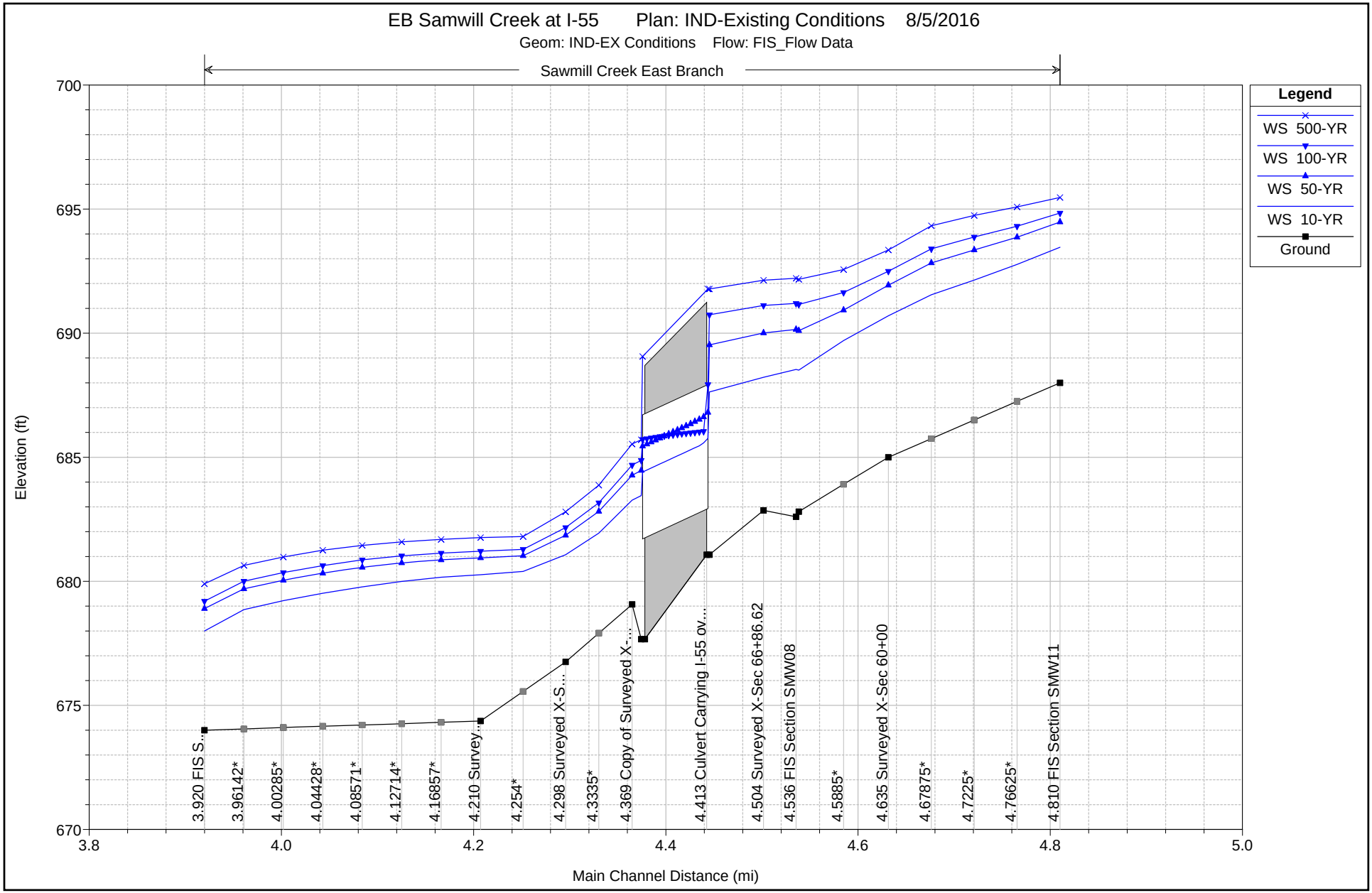

EB Samwill Creek at I-55 Plan: IND-Existing Conditions 8/5/2016
Geom: IND-EX Conditions Flow: FIS_Flow Data
Sawmill Creek East Branch
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Elevation (ft)
Main Channel Distance (mi)
700
695
690
685
680
675
670
3.8
4.0
4.2
4.4
4.6
4.8
5.0
3.920 FIS S...
3.96142*
4.00285*
4.04428*
4.08571*
4.12714*
4.16857*
4.210 Survey...
4.254*
4.298 Surveyed X-S...
4.3335*
4.369 Copy of Surveyed X-...
4.413 Culvert Carrying I-55 ov...
4.504 Surveyed X-Sec 66+86.62
4.536 FIS Section SMW08
4.5885*
4.635 Surveyed X-Sec 60+00
4.67875*
4.7225*
4.76625*
4.810 FIS Section SMW11

HEC-RAS Plan: 02 River: Sawmill Creek Reach: East Branch

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
East Branch	4.810	10-YR	297.70	688.00	693.46	690.58	693.55	0.002939	2.30	129.35	39.35	0.22
East Branch	4.810	50-YR	475.00	688.00	694.48	691.29	694.59	0.003024	2.66	208.42	257.30	0.23
East Branch	4.810	100-YR	565.98	688.00	694.84	691.60	694.95	0.002883	2.75	259.96	287.05	0.23
East Branch	4.810	500-YR	775.00	688.00	695.47	692.21	695.53	0.001786	2.37	552.74	323.47	0.19
East Branch	4.635	10-YR	297.70	685.00	690.70	688.43	690.94	0.004021	3.98	83.00	24.19	0.33
East Branch	4.635	50-YR	475.00	685.00	691.94	689.30	692.27	0.004231	4.81	116.09	32.26	0.36
East Branch	4.635	100-YR	565.98	685.00	692.50	689.68	692.87	0.004200	5.10	136.19	39.55	0.36
East Branch	4.635	500-YR	775.00	685.00	693.35	690.44	693.81	0.004617	5.83	192.03	91.09	0.39
East Branch	4.542	10-YR	297.70	682.81	688.51	686.43	688.75	0.005365	3.96	78.95	25.60	0.37
East Branch	4.542	50-YR	475.00	682.81	690.10	687.30	690.30	0.003238	3.86	164.59	78.27	0.30
East Branch	4.542	100-YR	565.98	682.81	691.16	687.71	691.28	0.001750	3.22	259.07	98.53	0.23
East Branch	4.542	500-YR	775.00	682.81	692.17	688.47	692.29	0.001454	3.25	368.53	120.16	0.21
East Branch	4.536	10-YR	324.77	682.60	688.54	685.26	688.69	0.001558	3.19	131.24	73.69	0.24
East Branch	4.536	50-YR	520.00	682.60	690.15	686.18	690.25	0.000917	2.92	331.34	171.69	0.20
East Branch	4.536	100-YR	617.38	682.60	691.20	686.56	691.25	0.000493	2.35	534.98	217.48	0.15
East Branch	4.536	500-YR	860.00	682.60	692.21	687.71	692.25	0.000419	2.35	777.62	262.30	0.14
East Branch	4.504	10-YR	324.77	682.86	688.22	686.16	688.34	0.002397	3.05	155.26	75.77	0.26
East Branch	4.504	50-YR	520.00	682.86	690.01	686.93	690.07	0.001009	2.50	340.12	125.02	0.18
East Branch	4.504	100-YR	617.38	682.86	691.12	687.30	691.15	0.000553	2.07	488.70	142.89	0.14
East Branch	4.504	500-YR	860.00	682.86	692.13	687.87	692.17	0.000507	2.16	639.72	153.19	0.13
East Branch	4.449	10-YR	324.77	681.07	687.63	684.12	687.75	0.001685	2.69	120.56	44.12	0.21
East Branch	4.449	50-YR	520.00	681.07	689.53	684.90	689.68	0.001675	3.15	165.25	120.18	0.21
East Branch	4.449	100-YR	617.38	681.07	690.74	685.21	690.89	0.001444	3.15	196.24	251.60	0.20
East Branch	4.449	500-YR	860.00	681.07	691.78	685.90	691.92	0.001663	3.19	477.12	522.80	0.22
East Branch	4.413		Culvert									
East Branch	4.378	10-YR	324.77	677.67	683.45	680.46	683.68	0.002572	3.81	85.18	34.14	0.29
East Branch	4.378	50-YR	520.00	677.67	684.46	681.32	684.87	0.003696	5.13	101.34	57.74	0.36
East Branch	4.378	100-YR	617.38	677.67	684.87	681.71	685.38	0.004231	5.72	107.87	81.27	0.39
East Branch	4.378	500-YR	860.00	677.67	685.71	682.59	686.49	0.005561	7.09	121.24	118.48	0.45
East Branch	4.369	10-YR	324.77	679.07	683.27	681.58	683.49	0.005879	3.77	86.85	32.01	0.37

HEC-RAS Plan: 02 River: Sawmill Creek Reach: East Branch (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
East Branch	4.369	50-YR	520.00	679.07	684.28	682.28	684.59	0.006142	4.54	117.04	46.74	0.39
East Branch	4.369	100-YR	617.38	679.07	684.69	682.60	685.05	0.006381	4.88	129.40	70.39	0.40
East Branch	4.369	500-YR	860.00	679.07	685.53	683.28	686.03	0.007139	5.69	155.06	110.03	0.43
East Branch	4.298	10-YR	324.77	676.75	681.07	679.46	681.24	0.003937	3.65	123.11	52.91	0.34
East Branch	4.298	50-YR	520.00	676.75	681.86	680.11	682.09	0.004616	4.50	167.69	61.23	0.38
East Branch	4.298	100-YR	617.38	676.75	682.17	680.38	682.44	0.004924	4.86	187.32	64.55	0.39
East Branch	4.298	500-YR	860.00	676.75	682.81	680.99	683.15	0.005535	5.61	231.23	74.65	0.43
East Branch	4.210	10-YR	324.77	674.37	680.27	676.80	680.28	0.000358	1.13	563.53	460.93	0.10
East Branch	4.210	50-YR	520.00	674.37	680.94	677.43	680.95	0.000305	1.15	890.46	506.91	0.09
East Branch	4.210	100-YR	617.38	674.37	681.21	677.71	681.22	0.000295	1.18	1030.29	525.01	0.09
East Branch	4.210	500-YR	860.00	674.37	681.77	678.32	681.78	0.000289	1.25	1329.26	558.42	0.09
East Branch	3.920	10-YR	385.63	674.00	678.00	676.52	678.26	0.005713	4.18	109.83	73.67	0.42
East Branch	3.920	50-YR	615.00	674.00	678.90	677.43	679.16	0.004987	4.46	195.44	116.57	0.40
East Branch	3.920	100-YR	732.97	674.00	679.20	677.91	679.47	0.005039	4.65	232.55	130.87	0.41
East Branch	3.920	500-YR	1000.00	674.00	679.90	678.58	680.15	0.004412	4.70	335.84	164.23	0.39

HEC-RAS Plan: 02 River: Sawmill Creek Reach: East Branch

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
East Branch	4.810	10-YR	693.55	693.46	0.08	0.68	0.00		297.70		39.35
East Branch	4.810	50-YR	694.59	694.48	0.11	0.62	0.00	17.69	457.04	0.27	257.30
East Branch	4.810	100-YR	694.95	694.84	0.11	0.55	0.01	48.84	515.60	1.54	287.05
East Branch	4.810	500-YR	695.53	695.47	0.06	0.37	0.00	106.02	507.62	161.36	323.47
East Branch	4.635	10-YR	690.94	690.70	0.23	1.01	0.00	14.53	282.40	0.77	24.19
East Branch	4.635	50-YR	692.27	691.94	0.33	1.03	0.01	35.60	436.14	3.26	32.26
East Branch	4.635	100-YR	692.87	692.50	0.37	0.93	0.03	48.80	508.81	8.37	39.55
East Branch	4.635	500-YR	693.81	693.35	0.46	0.92	0.06	78.01	661.09	35.90	91.09
East Branch	4.542	10-YR	688.75	688.51	0.24	0.04	0.03	6.40	291.30		25.60
East Branch	4.542	50-YR	690.30	690.10	0.20	0.02	0.03	22.63	412.48	39.89	78.27
East Branch	4.542	100-YR	691.28	691.16	0.12	0.01	0.02	32.80	416.03	117.15	98.53
East Branch	4.542	500-YR	692.29	692.17	0.11	0.01	0.02	44.49	489.02	241.48	120.16
East Branch	4.536	10-YR	688.69	688.54	0.15	0.34	0.01	8.76	302.51	13.50	73.69
East Branch	4.536	50-YR	690.25	690.15	0.10	0.17	0.01	68.13	362.17	89.70	171.69
East Branch	4.536	100-YR	691.25	691.20	0.05	0.09	0.00	123.36	336.07	157.95	217.48
East Branch	4.536	500-YR	692.25	692.21	0.04	0.08	0.00	215.75	378.50	265.75	262.30
East Branch	4.504	10-YR	688.34	688.22	0.11	0.59	0.00	24.43	239.86	60.48	75.77
East Branch	4.504	50-YR	690.07	690.01	0.06	0.38	0.01	66.52	278.58	174.90	125.02
East Branch	4.504	100-YR	691.15	691.12	0.04	0.25	0.01	99.15	273.12	245.11	142.89
East Branch	4.504	500-YR	692.17	692.13	0.04	0.25	0.01	149.41	326.16	384.44	153.19
East Branch	4.449	10-YR	687.75	687.63	0.11				324.77		44.12
East Branch	4.449	50-YR	689.68	689.53	0.15				520.00		120.18
East Branch	4.449	100-YR	690.89	690.74	0.15				617.38		251.60
East Branch	4.449	500-YR	691.92	691.78	0.13			64.64	725.61	69.74	522.80
East Branch	4.413		Culvert								
East Branch	4.378	10-YR	683.68	683.45	0.23	0.19	0.00		324.77		34.14
East Branch	4.378	50-YR	684.87	684.46	0.41	0.24	0.05		520.00		57.74
East Branch	4.378	100-YR	685.38	684.87	0.51	0.26	0.07		617.38		81.27
East Branch	4.378	500-YR	686.49	685.71	0.78	0.32	0.14		860.00		118.48

HEC-RAS Plan: 02 River: Sawmill Creek Reach: East Branch (Continued)

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
East Branch	4.369	10-YR	683.49	683.27	0.22	1.24	0.01	0.49	324.28		32.01
East Branch	4.369	50-YR	684.59	684.28	0.32	1.34	0.01	5.61	514.39		46.74
East Branch	4.369	100-YR	685.05	684.69	0.37	1.39	0.01	9.00	608.38		70.39
East Branch	4.369	500-YR	686.03	685.53	0.49	1.52	0.01	18.57	841.43		110.03
East Branch	4.298	10-YR	681.24	681.07	0.16	0.71	0.01	11.92	246.12	66.73	52.91
East Branch	4.298	50-YR	682.09	681.86	0.24	0.87	0.02	24.61	368.71	126.69	61.23
East Branch	4.298	100-YR	682.44	682.17	0.27	0.93	0.02	31.66	426.72	159.00	64.55
East Branch	4.298	500-YR	683.15	682.81	0.35	1.07	0.03	50.05	558.75	251.20	74.65
East Branch	4.210	10-YR	680.28	680.27	0.01	0.09	0.00	139.61	184.90	0.26	460.93
East Branch	4.210	50-YR	680.95	680.94	0.01	0.08	0.00	296.01	219.57	4.42	506.91
East Branch	4.210	100-YR	681.22	681.21	0.01	0.07	0.00	372.90	236.27	8.21	525.01
East Branch	4.210	500-YR	681.78	681.77	0.01	0.07	0.00	561.42	277.43	21.15	558.42
East Branch	3.920	10-YR	678.26	678.00	0.26			21.54	364.09		73.67
East Branch	3.920	50-YR	679.16	678.90	0.26			111.44	503.56		116.57
East Branch	3.920	100-YR	679.47	679.20	0.27			165.60	567.37		130.87
East Branch	3.920	500-YR	680.15	679.90	0.25			323.70	676.30		164.23

HEC-RAS Plan: 02 River: Sawmill Creek Reach: East Branch

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
East Branch	4.504	10-YR	688.34	688.22	0.11	0.59	0.00	24.43	239.86	60.48	75.77
East Branch	4.504	50-YR	690.07	690.01	0.06	0.38	0.01	66.52	278.58	174.90	125.02
East Branch	4.504	100-YR	691.15	691.12	0.04	0.25	0.01	99.15	273.12	245.11	142.89
East Branch	4.504	500-YR	692.17	692.13	0.04	0.25	0.01	149.41	326.16	384.44	153.19
East Branch	4.449	10-YR	687.75	687.63	0.11				324.77		44.12
East Branch	4.449	50-YR	689.68	689.53	0.15				520.00		120.18
East Branch	4.449	100-YR	690.89	690.74	0.15				617.38		251.60
East Branch	4.449	500-YR	691.92	691.78	0.13			64.64	725.61	69.74	522.80
East Branch	4.413		Culvert								
East Branch	4.378	10-YR	683.68	683.45	0.23	0.19	0.00		324.77		34.14
East Branch	4.378	50-YR	684.87	684.46	0.41	0.24	0.05		520.00		57.74
East Branch	4.378	100-YR	685.38	684.87	0.51	0.26	0.07		617.38		81.27
East Branch	4.378	500-YR	686.49	685.71	0.78	0.32	0.14		860.00		118.48
East Branch	4.369	10-YR	683.49	683.27	0.22	1.24	0.01	0.49	324.28		32.01
East Branch	4.369	50-YR	684.59	684.28	0.32	1.34	0.01	5.61	514.39		46.74
East Branch	4.369	100-YR	685.05	684.69	0.37	1.39	0.01	9.00	608.38		70.39
East Branch	4.369	500-YR	686.03	685.53	0.49	1.52	0.01	18.57	841.43		110.03

HEC-RAS Plan: 02 River: Sawmill Creek Reach: East Branch

Reach	River Sta	Profile	E.G. US.	W.S. US.	E.G. IC	E.G. OC	Min El Weir Flow	Q Culv Group	Q Weir	Delta WS	Culv Vel US	Culv Vel DS
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(ft)	(ft/s)	(ft/s)
East Branch	4.413 Culvert #1	10-YR	687.75	687.63	687.49	687.75	691.25	324.77		4.18	9.55	10.04
East Branch	4.413 Culvert #1	50-YR	689.68	689.53	689.68	689.52	691.25	520.00		5.06	11.17	11.59
East Branch	4.413 Culvert #1	100-YR	690.90	690.74	690.90	690.32	691.25	617.38		5.87	10.29	12.84
East Branch	4.413 Culvert #1	500-YR	691.92	691.78	691.92	690.95	691.25	698.09	161.91	6.07	11.63	13.78

Errors Warnings and Notes for Plan : 02

Location:	River: Sawmill Creek Reach: East Branch RS: 4.810 Profile: 10-YR
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.635 Profile: 10-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.5885* Profile: 10-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.542 Profile: 10-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.413 Profile: 10-YR Culv: Culvert #1
Note:	During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
	depth at the outlet.
Note:	The flow in the culvert is entirely supercritical.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.378 Profile: 10-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.369 Profile: 10-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.3335* Profile: 10-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.254* Profile: 10-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.210 Profile: 10-YR
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.12714* Profile: 10-YR
Warning:	Divided flow computed for this cross-section.
Location:	River: Sawmill Creek Reach: East Branch RS: 3.96142* Profile: 10-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.

Errors Warnings and Notes for Plan : 02

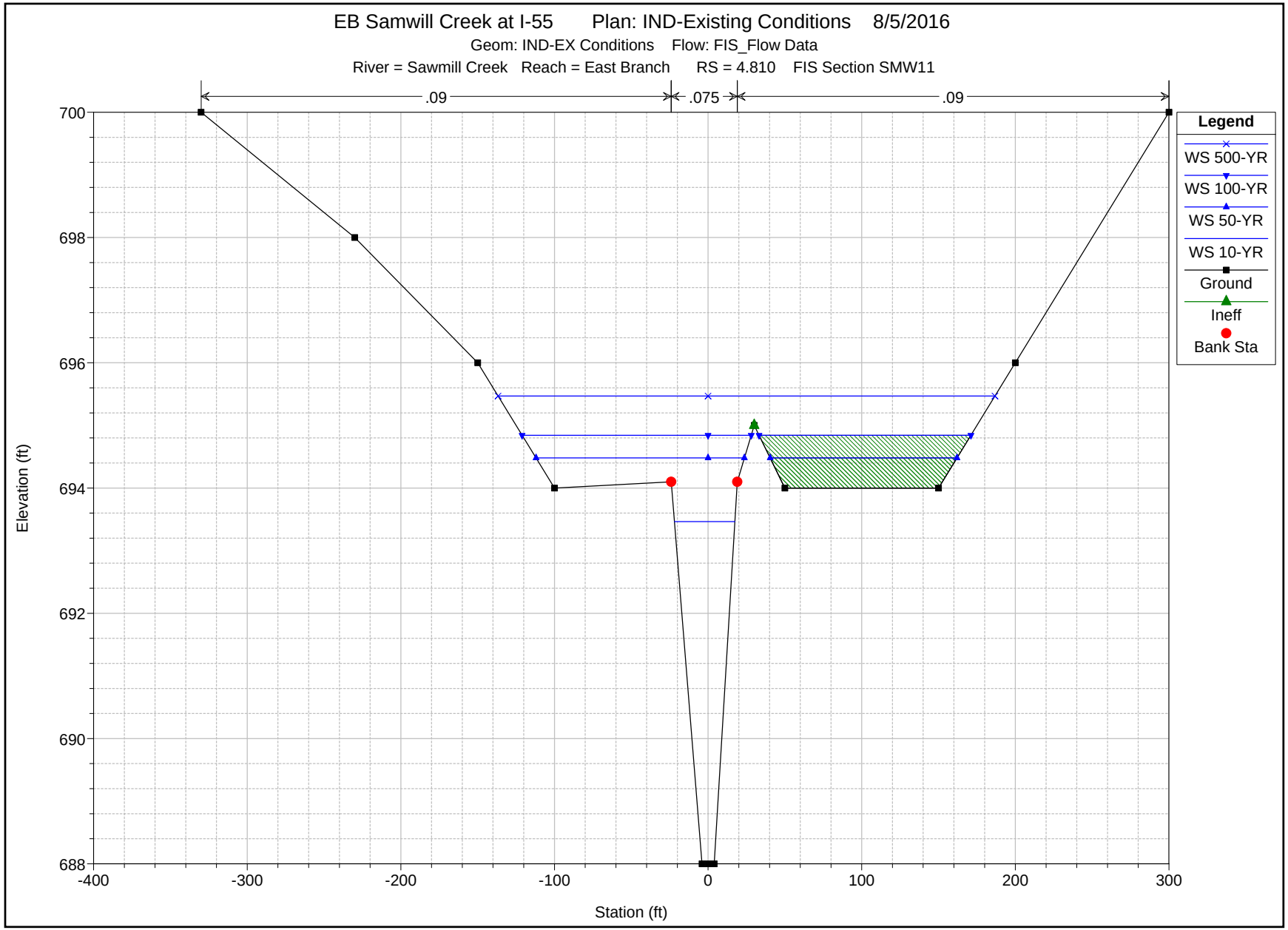
Location:	River: Sawmill Creek Reach: East Branch RS: 4.810 Profile: 50-YR
Warning:	Divided flow computed for this cross-section.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.76625* Profile: 50-YR
Warning:	Divided flow computed for this cross-section.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.67875* Profile: 50-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.635 Profile: 50-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.542 Profile: 50-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.413 Profile: 50-YR Culv: Culvert #1
Note:	During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
	depth at the outlet.
Note:	The flow in the culvert is entirely supercritical.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.369 Profile: 50-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.3335* Profile: 50-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.254* Profile: 50-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.210 Profile: 50-YR
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 3.96142* Profile: 50-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.

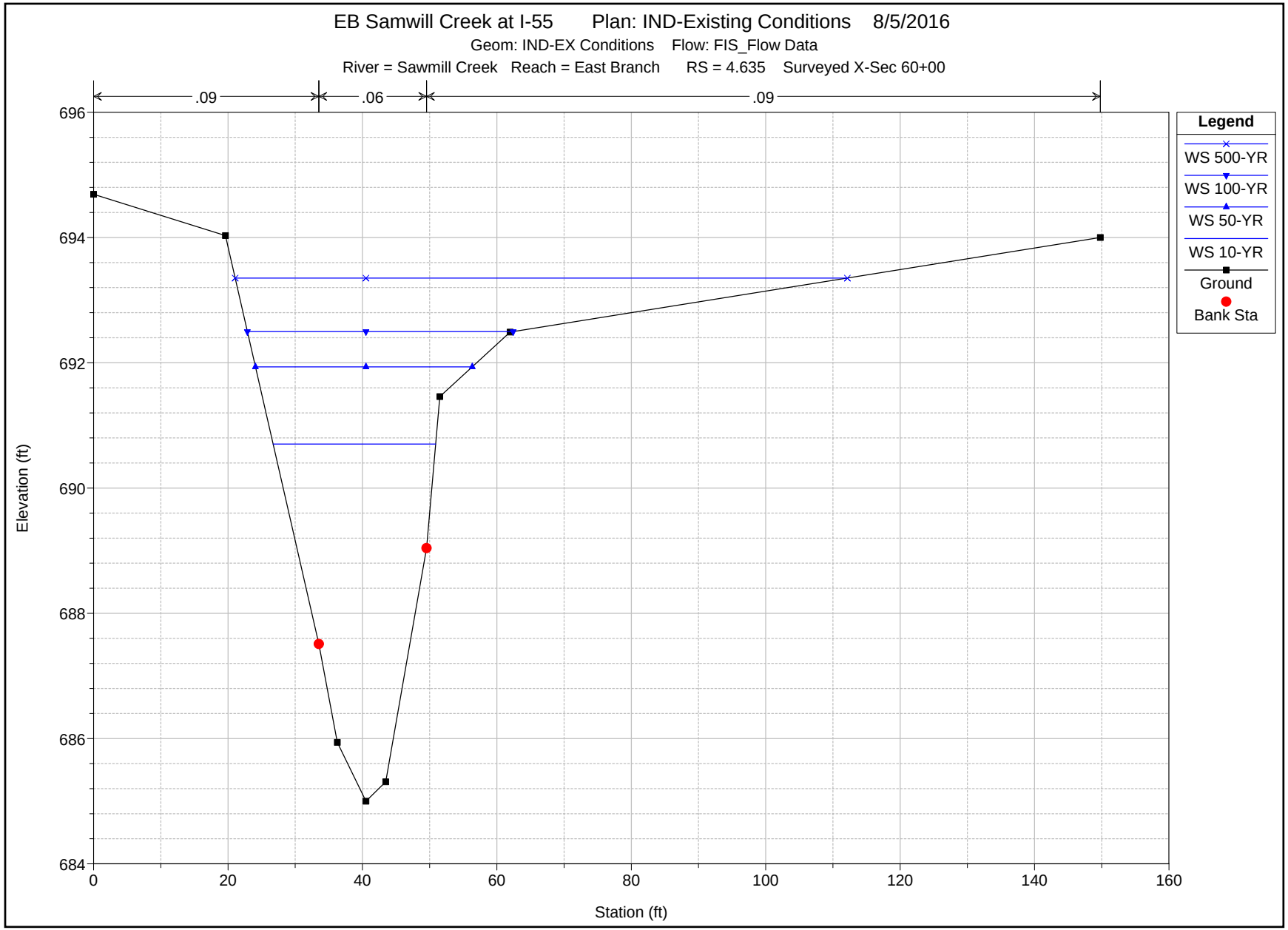
Errors Warnings and Notes for Plan : 02

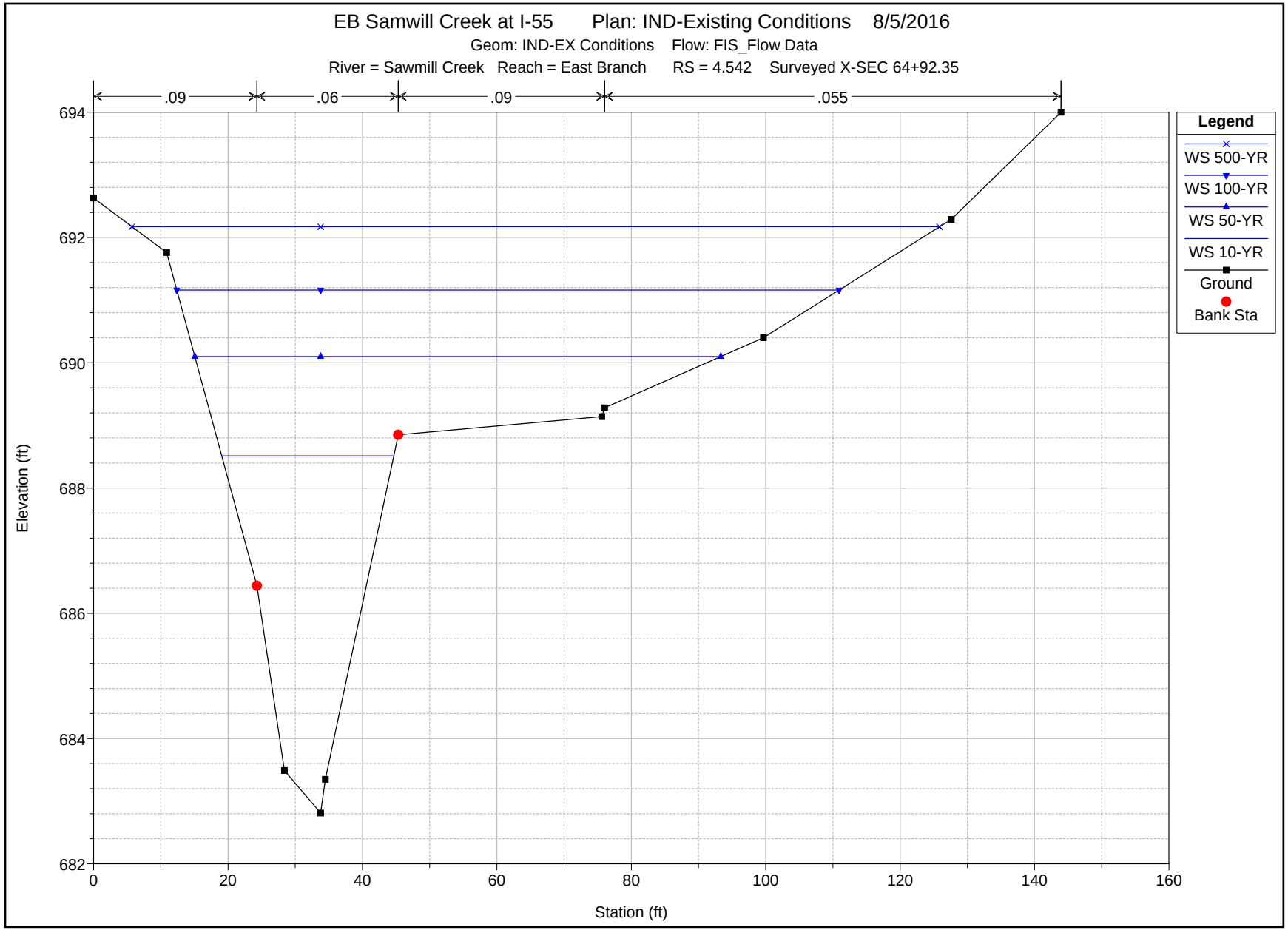
Location:	River: Sawmill Creek Reach: East Branch RS: 4.810 Profile: 100-YR
Warning:	Divided flow computed for this cross-section.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.67875* Profile: 100-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.542 Profile: 100-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.504 Profile: 100-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.413 Profile: 100-YR Culv: Culvert #1
Note:	The flow in the culvert is entirely supercritical.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.369 Profile: 100-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.3335* Profile: 100-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.254* Profile: 100-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.210 Profile: 100-YR
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 3.96142* Profile: 100-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.

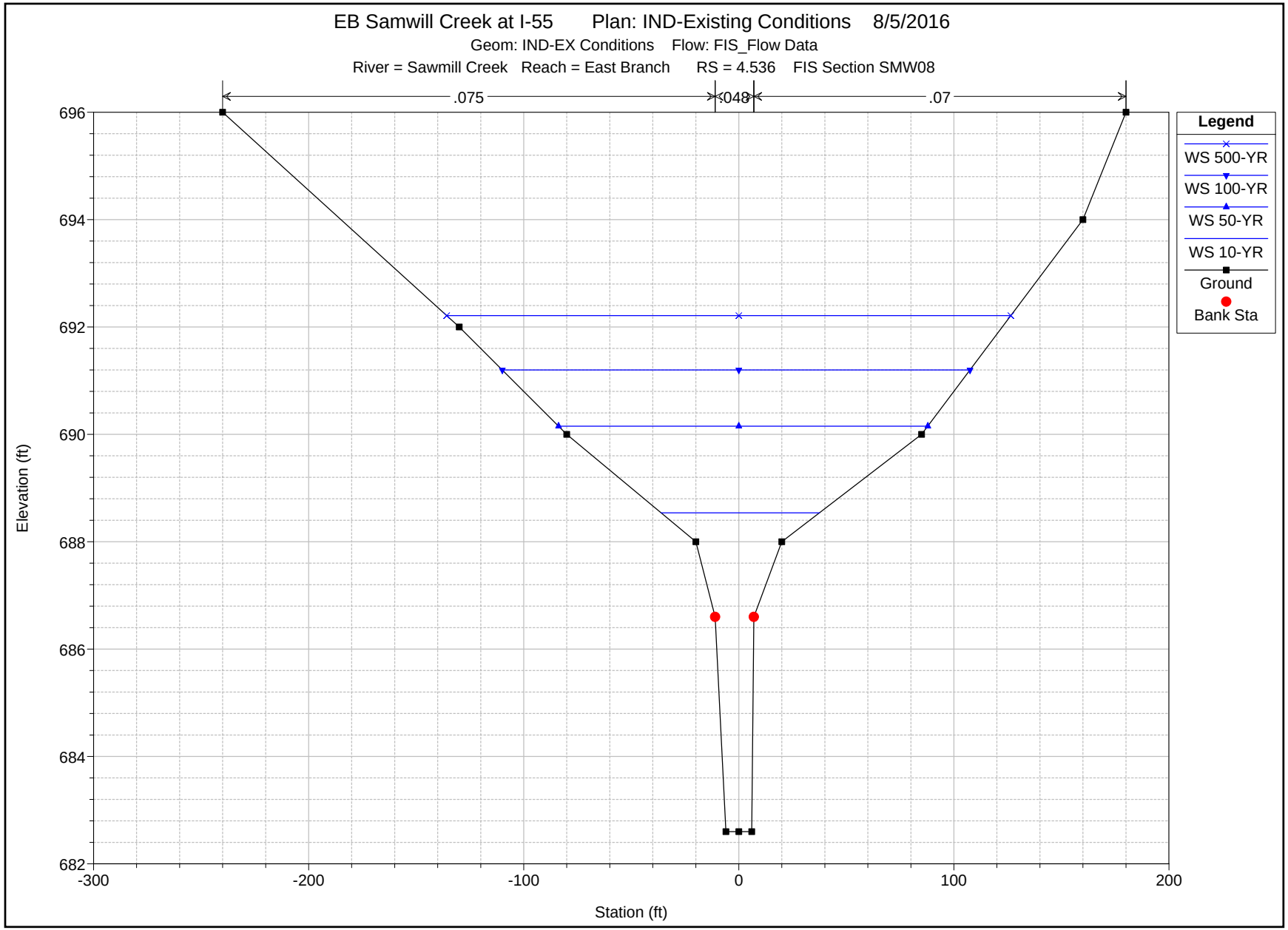
Errors Warnings and Notes for Plan : 02

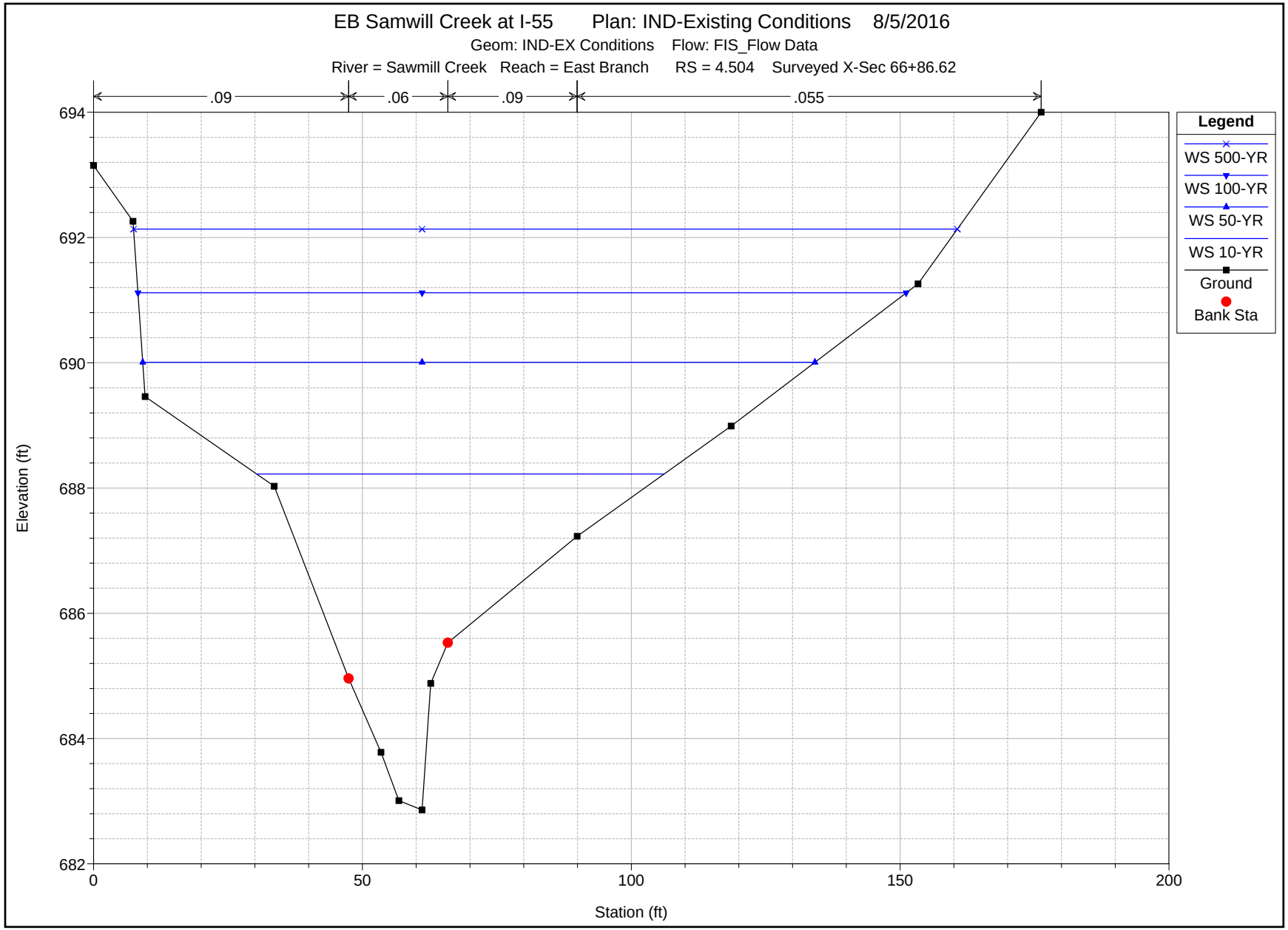
Location:	River: Sawmill Creek Reach: East Branch RS: 4.810 Profile: 500-YR
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.67875* Profile: 500-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.5885* Profile: 500-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.542 Profile: 500-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.504 Profile: 500-YR
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.413 Profile: 500-YR Culv: Culvert #1
Warning:	During the culvert outlet control computations, the program could not balance the culvert/weir flow. The reported outlet
	energy grade answer may not be valid.
Note:	The flow in the culvert is entirely supercritical.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.378 Profile: 500-YR
Warning:	Divided flow computed for this cross-section.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.369 Profile: 500-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.3335* Profile: 500-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.298 Profile: 500-YR
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
	need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.254* Profile: 500-YR
Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
	This may indicate the need for additional cross sections.
Location:	River: Sawmill Creek Reach: East Branch RS: 4.210 Profile: 500-YR
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

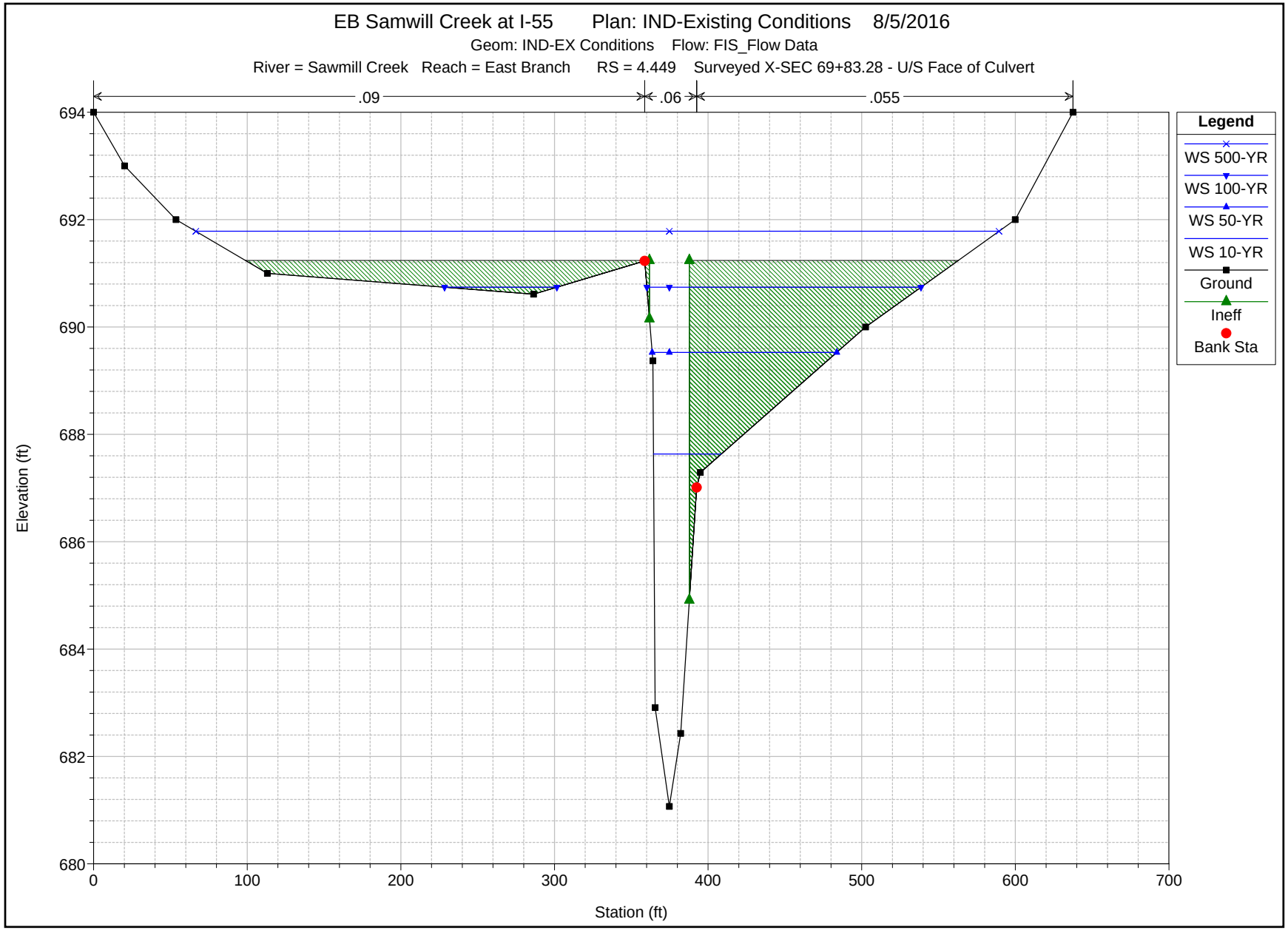

EB Samwill Creek at I-55 Plan: IND-Existing Conditions 8/5/2016
Geom: IND-EX Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.810 FIS Section SMW11
.09
.075
.09
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Ineff
Bank Sta
Elevation (ft)
700
698
696
694
692
690
688
-400
-300
-200
-100
0
100
200
300
Station (ft)

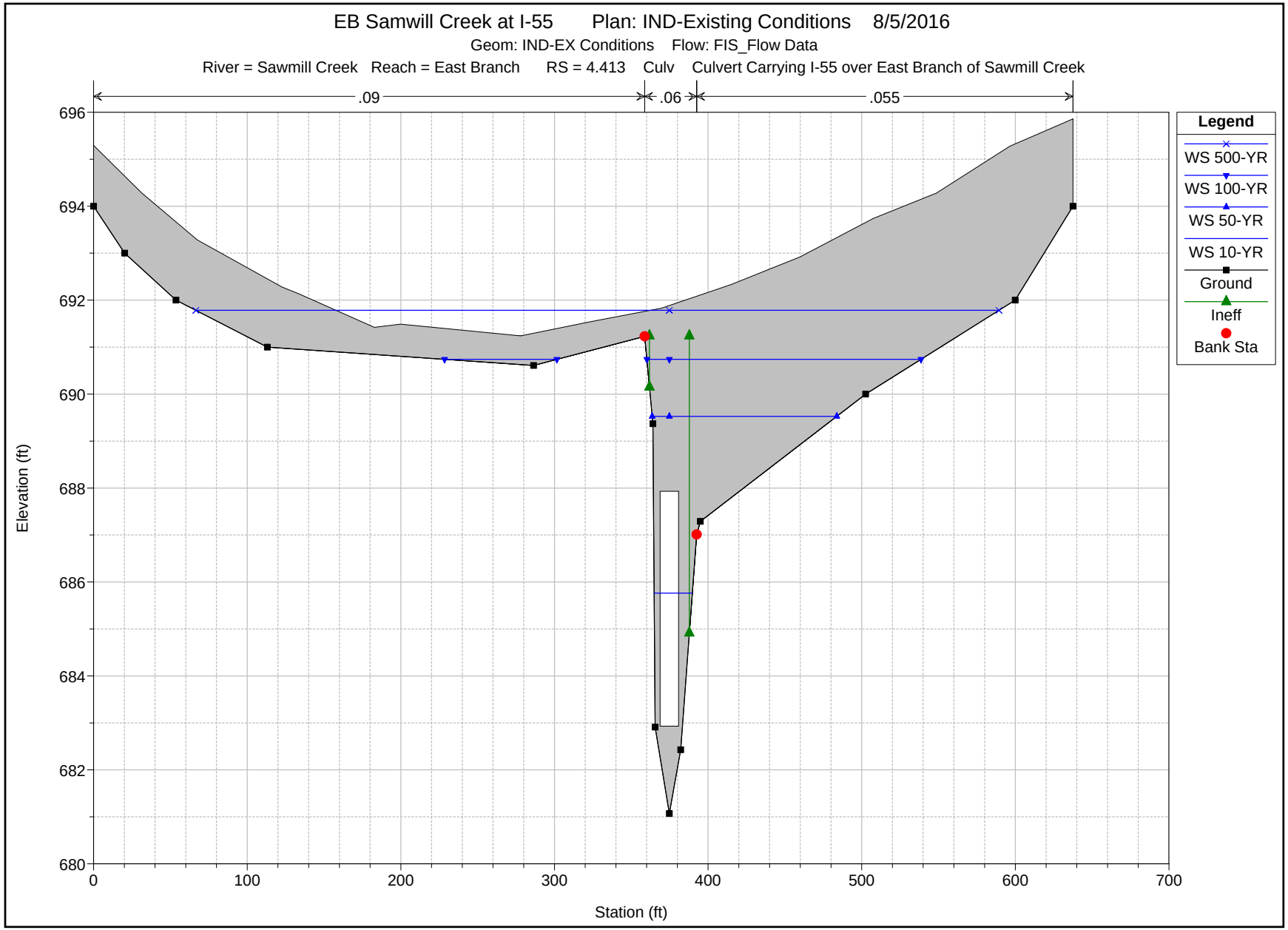

EB Samwill Creek at I-55 Plan: IND-Existing Conditions 8/5/2016
Geom: IND-EX Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.635 Surveyed X-Sec 60+00
.09
.06
.09
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta
Elevation (ft)
696
694
692
690
688
686
684
0
20
40
60
80
100
120
140
160
Station (ft)

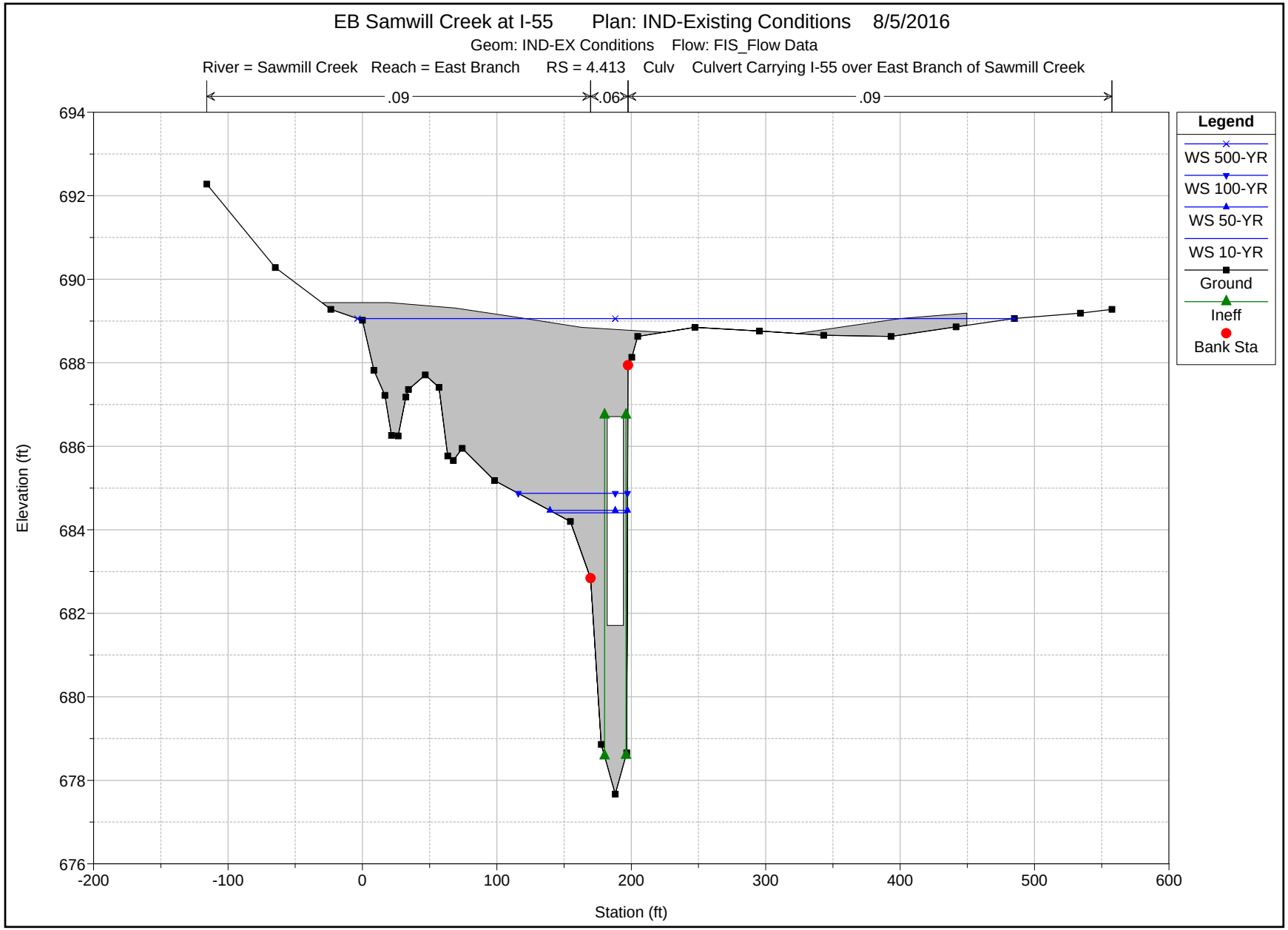

EB Samwill Creek at I-55 Plan: IND-Existing Conditions 8/5/2016
Geom: IND-EX Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.542 Surveyed X-SEC 64+92.35
.09
.06
.09
.055
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta
Elevation (ft)
694
692
690
688
686
684
682
0
20
40
60
80
100
120
140
160
Station (ft)

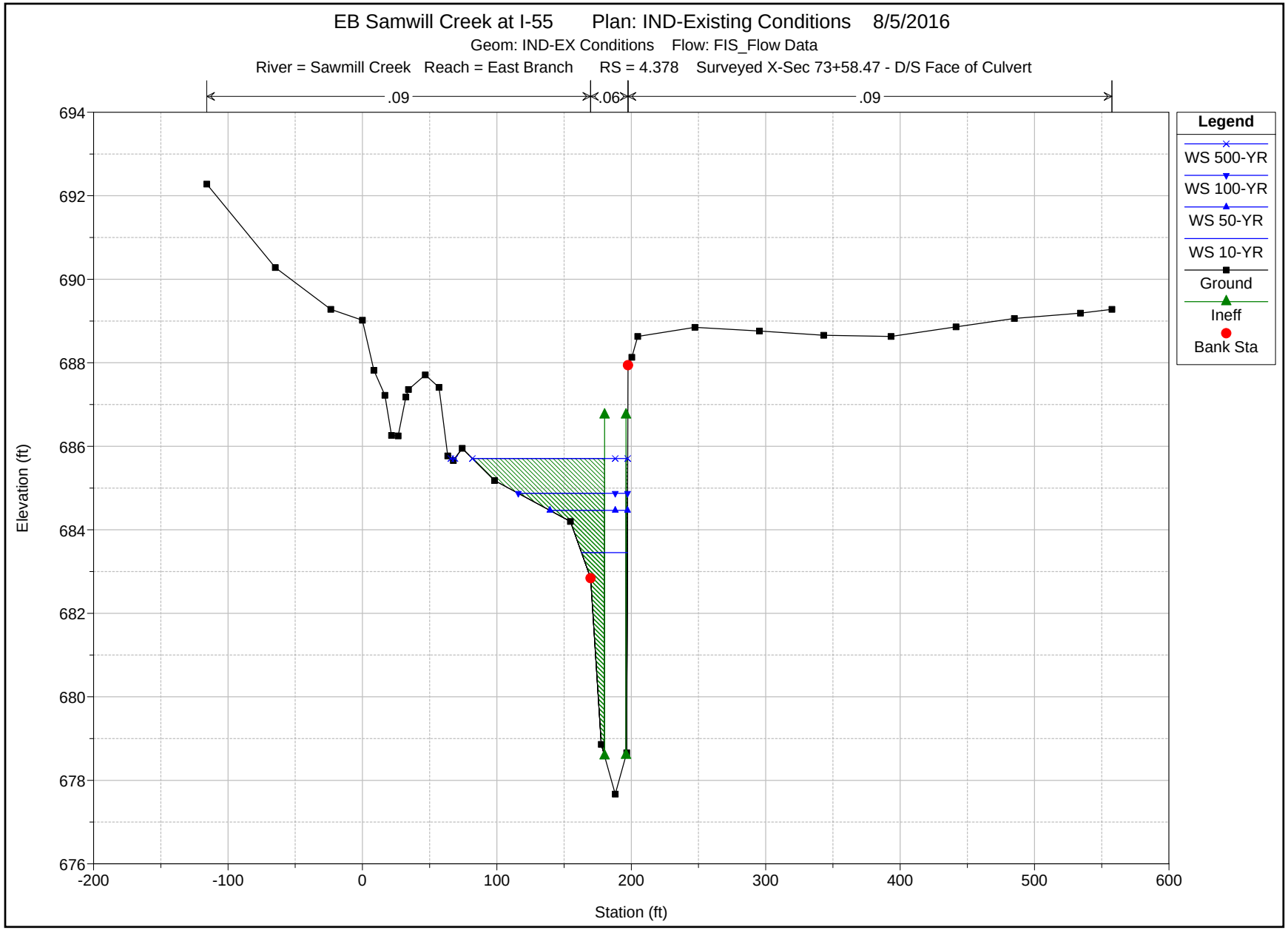

EB Samwill Creek at I-55 Plan: IND-Existing Conditions 8/5/2016
Geom: IND-EX Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.536 FIS Section SMW08
.075
.048
.07
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta
Elevation (ft)
696
694
692
690
688
686
684
682
-300
-200
-100
0
100
200
Station (ft)

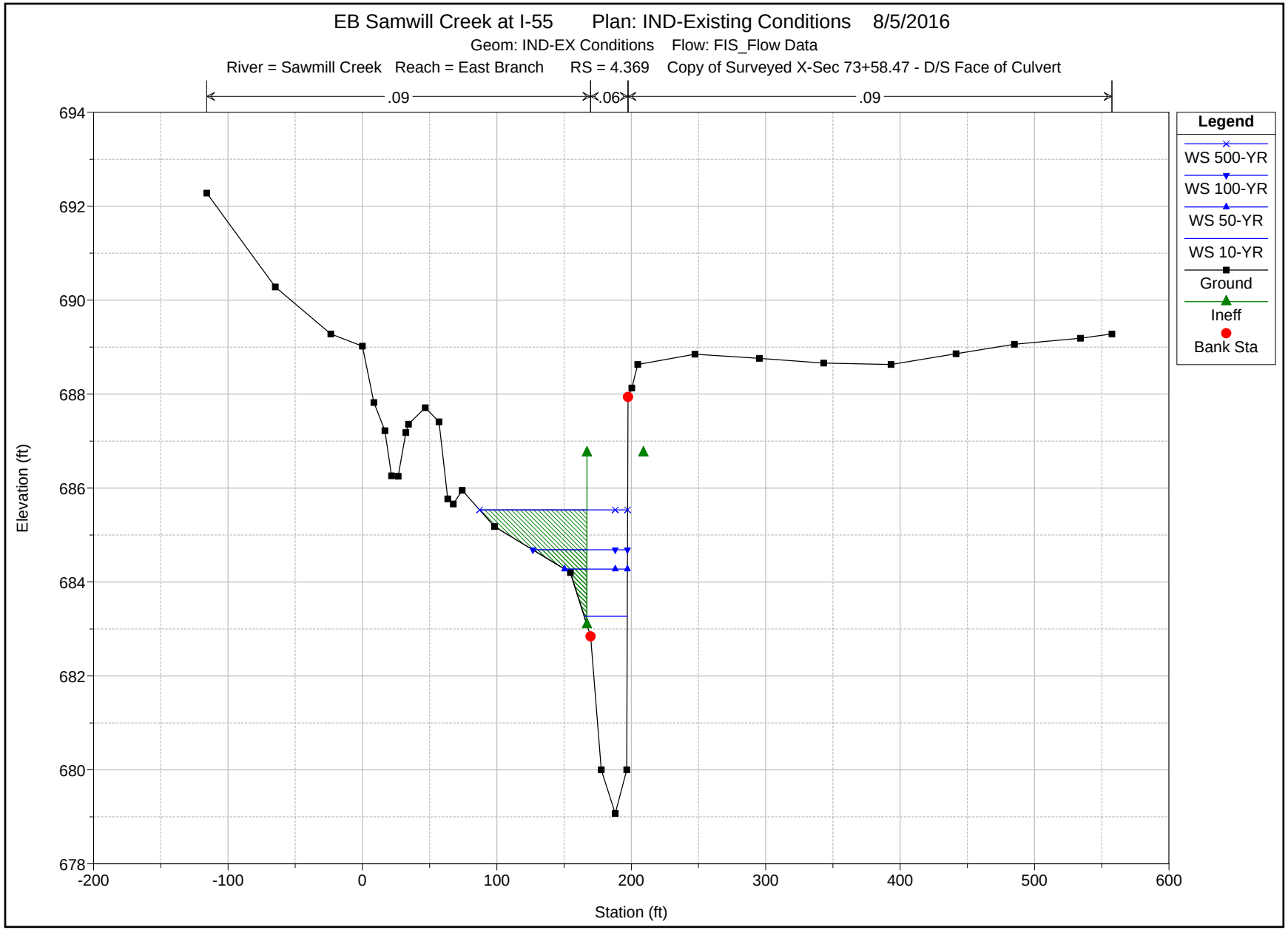

EB Samwill Creek at I-55 Plan: IND-Existing Conditions 8/5/2016
Geom: IND-EX Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.504 Surveyed X-Sec 66+86.62
.09
.06
.09
.055
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta
Elevation (ft)
694
692
690
688
686
684
682
0
50
100
150
200
Station (ft)

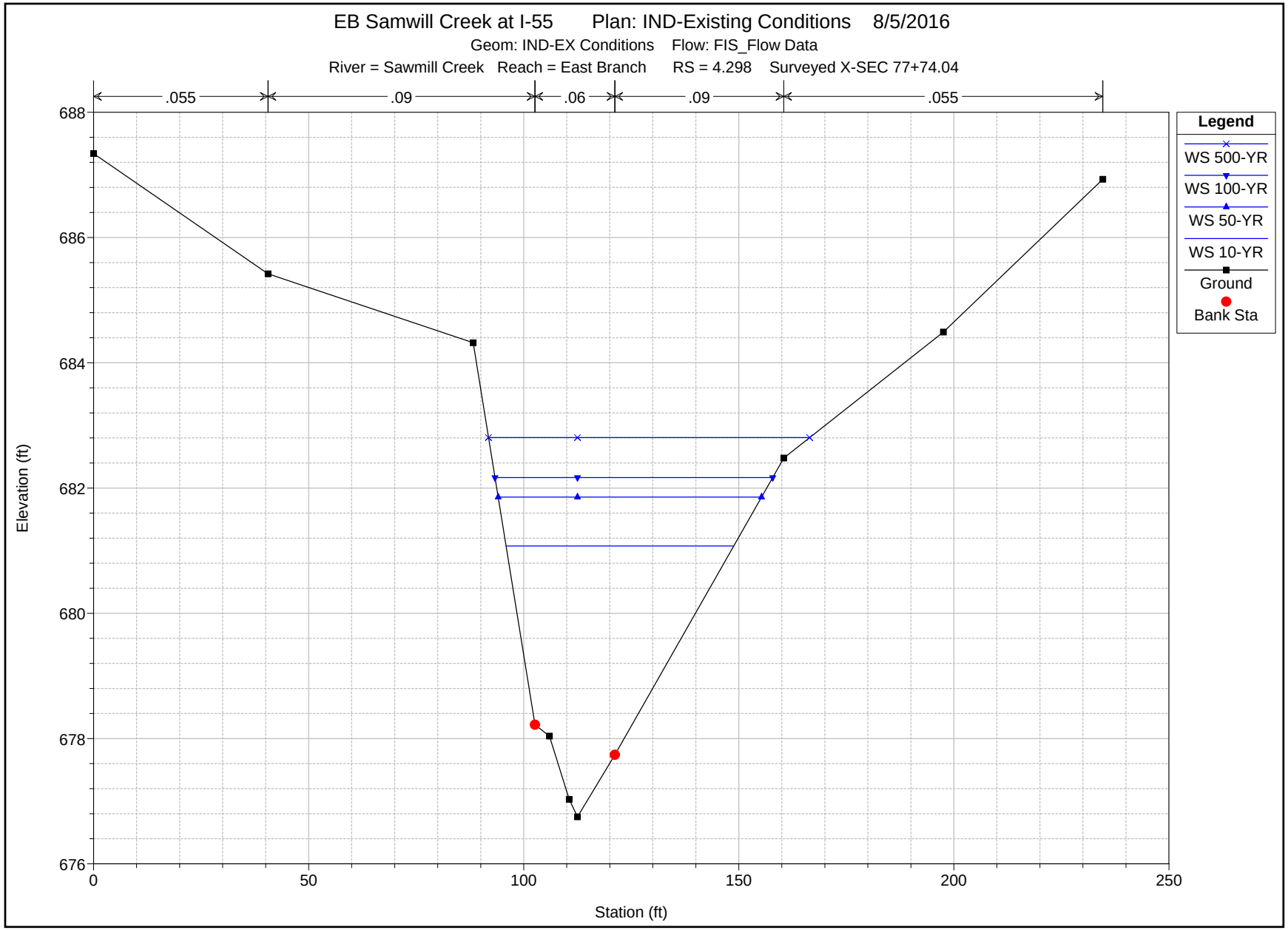

EB Samwill Creek at I-55 Plan: IND-Existing Conditions 8/5/2016
Geom: IND-EX Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.449 Surveyed X-SEC 69+83.28 - U/S Face of Culvert
.09
.06
.055
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Ineff
Bank Sta
Elevation (ft)
694
692
690
688
686
684
682
680
0
100
200
300
400
500
600
700
Station (ft)

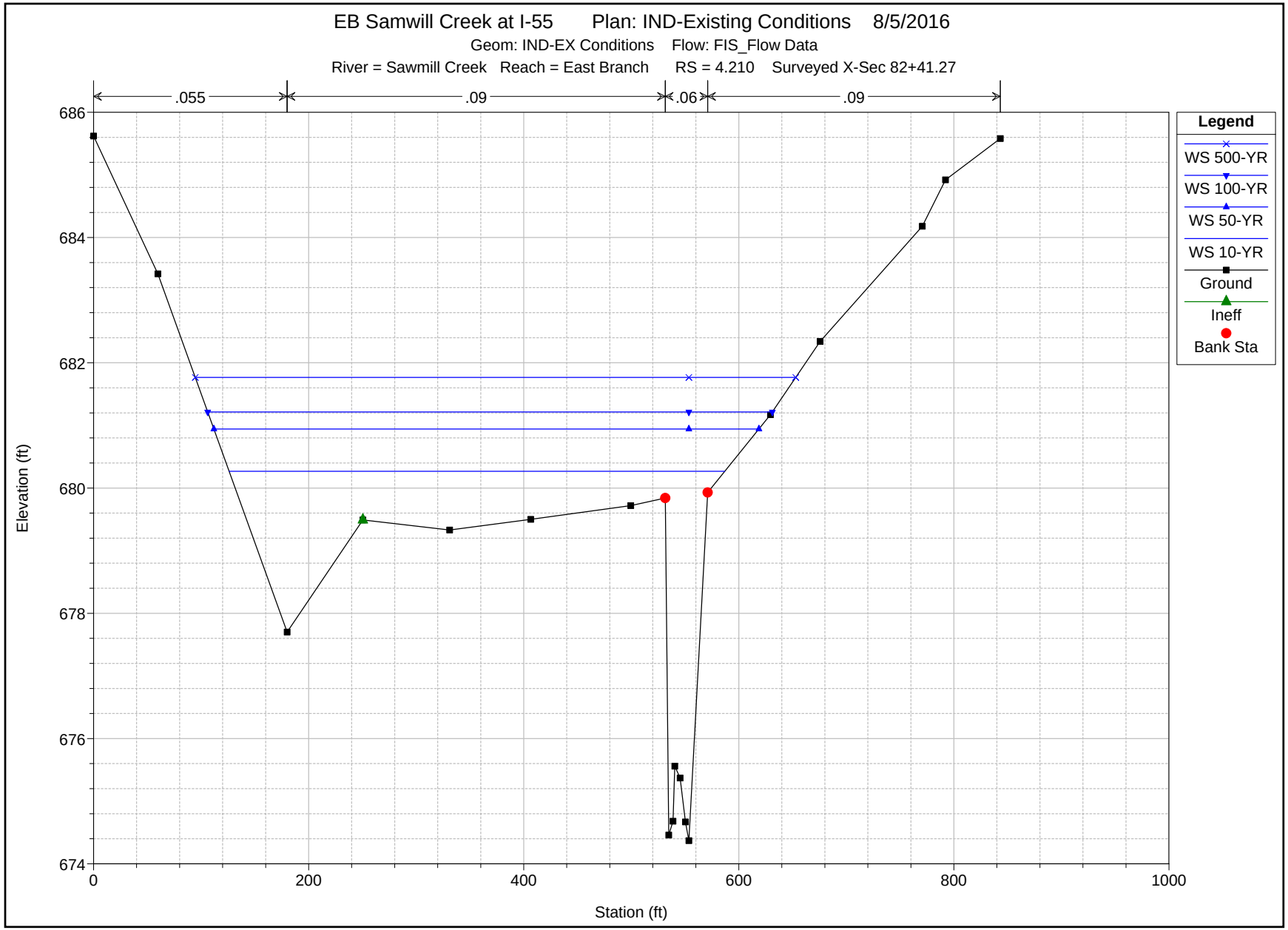

EB Samwill Creek at I-55 Plan: IND-Existing Conditions 8/5/2016
Geom: IND-EX Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.413 Culv Culvert Carrying I-55 over East Branch of Sawmill Creek
.09
.06
.055
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
696
694
692
690
688
686
684
682
680
0
100
200
300
400
500
600
700


EB Samwill Creek at I-55 Plan: IND-Existing Conditions 8/5/2016
Geom: IND-EX Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.413 Culv Culvert Carrying I-55 over East Branch of Sawmill Creek
.09
.06
.09
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Ineff
Bank Sta
Elevation (ft)
694
692
690
688
686
684
682
680
678
676
-200
-100
0
100
200
300
400
500
600
Station (ft)


EB Samwill Creek at I-55 Plan: IND-Existing Conditions 8/5/2016
Geom: IND-EX Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.378 Surveyed X-Sec 73+58.47 - D/S Face of Culvert
.09
.06
.09
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Ineff
Bank Sta
Elevation (ft)
694
692
690
688
686
684
682
680
678
676
-200
-100
0
100
200
300
400
500
600
Station (ft)


EB Samwill Creek at I-55 Plan: IND-Existing Conditions 8/5/2016
Geom: IND-EX Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.369 Copy of Surveyed X-Sec 73+58.47 - D/S Face of Culvert
.09
.06
.09
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Ineff
Bank Sta
Elevation (ft)
694
692
690
688
686
684
682
680
678
-200
-100
0
100
200
300
400
500
600
Station (ft)


EB Samwill Creek at I-55 Plan: IND-Existing Conditions 8/5/2016
Geom: IND-EX Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.298 Surveyed X-SEC 77+74.04
.055
.09
.06
.09
.055
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta
Elevation (ft)
688
686
684
682
680
678
676
0
50
100
150
200
250
Station (ft)


EB Samwill Creek at I-55 Plan: IND-Existing Conditions 8/5/2016
Geom: IND-EX Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 4.210 Surveyed X-Sec 82+41.27
.055
.09
.06
.09
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Ineff
Bank Sta
Elevation (ft)
686
684
682
680
678
676
674
0
200
400
600
800
1000
Station (ft)

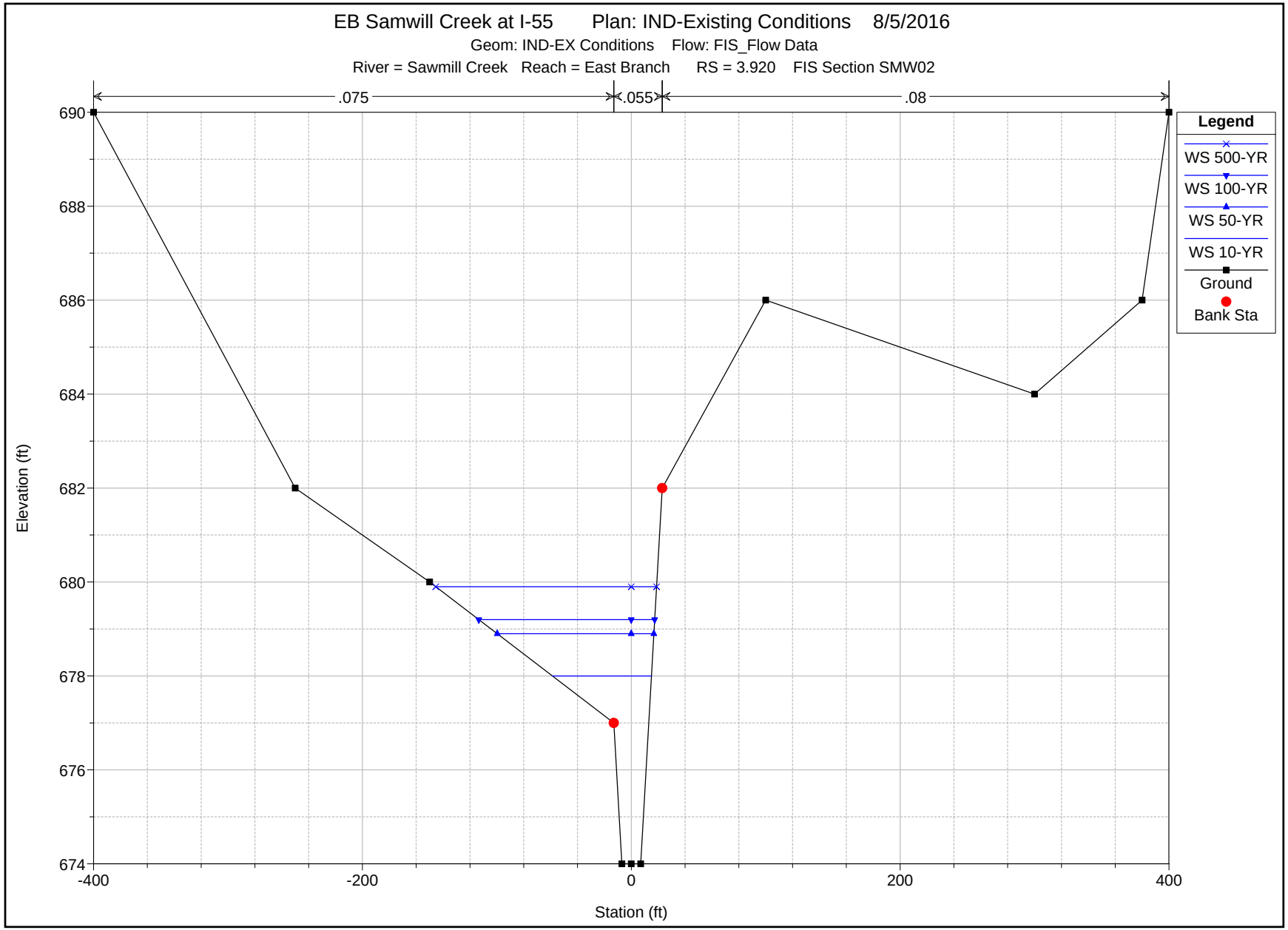

EB Samwill Creek at I-55 Plan: IND-Existing Conditions 8/5/2016
Geom: IND-EX Conditions Flow: FIS_Flow Data
River = Sawmill Creek Reach = East Branch RS = 3.920 FIS Section SMW02
.075
.055
.08
Legend
WS 500-YR
WS 100-YR
WS 50-YR
WS 10-YR
Ground
Bank Sta
Elevation (ft)
690
688
686
684
682
680
678
676
674
-400
-200
0
200
400
Station (ft)

EXHIBIT K

PROPOSED CONDITIONS HYDRAULIC MODEL AND RESULTS

EXHIBIT L

PERMIT SUMMARY

EXHIBIT M

COMPENSATORY STORAGE

EXHIBIT N

CORRESPONDENCE

Book, Dustin

From: Winograd, Esther B
Sent: Wednesday, July 18, 2012 2:44 PM
To: Kendall, David A.
Cc: Phan, Michael T; Shirani, Agar B; Masouridis, Eleftherios P
Subject: I-55, I-355 to I-94, vaious streams.
Attachments: SawmillCk-andtribs_ModelsEtcFromISWS-FPI.zip; SKMBT_42112071814410.pdf

Hi Dave,

Attached is a zipped file containing hydraulic modeling for the various streams that may need hydraulic report as part of the subject project. The attached information was received from ISWS. In addition, attached some correspondence with ISWS explaining various issues related to the zipped file. One of the issues to be aware of is the changing names of the Sawmill tributaries between the various FEMA studies.

It is also suggested that you contact FEMA and DuPage County for available models to complement the information from ISWS.

Please let me know if you have any question regarding the above.
Thanks

Esther Winograd
Hydraulic Section
Bureau of programming
IDOT-DOH
201 West Center Court,
Schaumburg, IL 60196-1096
tel; 847/705-4475

Winograd, Esther B

From: Winograd, Esther B
Sent: Thursday, January 26, 2012 10:12 AM
To: 'Saylor, William F'
Cc: Masouridis, Eleftherios P
Subject: RE: I-55 in Dupage Counties

Thank you much.

I can add one error I believe I found: Drainage area for Wards Creek is noted in the published FIS study as less than 1 sq. mile, but when you check with the USGS it is about 3 sq. miles.

Esther Winograd
847/705-4475

From: Saylor, William F [mailto:wsaylor@illinois.edu]
Sent: Thursday, January 26, 2012 9:58 AM
To: Winograd, Esther B
Subject: RE: I-55 in Dupage Counties

Esther,

It will take me some time to get some scans to you, as I am very behind on pending requests. I don't have all of the data. Here is the context of the FEMA-effective mapping in the Sawmill Creek watershed across I-55 that you should know:

- The FEMA-effective flood hazard mapping in the watershed is from a combination of the DuPage County Unincorporated Areas 1982 FIRM/FIS, the City of Darien 1979 FIRM/FIS, and 1990s LOMRs on each stream in Darien. Separate models or model runs were used for each of these products; it will be important to refer to the corporate limits shown on the pre-countywide 1979 & 1982 FIRMs. Later I will send you scans of my annotated pre-countywide maps for reference.

- I-55 was shown mostly on the DuPage County Unincorporated Areas FIRMs through here. I do not have the FEMA archive models for the DuPage County Unincorporated Areas FIRMs/FIS. I have print copies (only) of the models from the Darien 1979 FIS, but some of the Darien FIS models started above I-55.

- While the LOMRs are all upstream, the case files for them may include electronic versions of the before and after models. I only have data from one of the LOMRs. Details later.

- The 2004 DuPage County FIS does not completely or accurately incorporate all of the sources. The flood profiles and floodway data table have errors. I will provide my notes on that as well.

- The tributaries have been labeled with different names among the various FIRMs, and even on the current FIRM. You would probably need to include all the possible names in an order to the FEMA Engineering Library, or a request to DuPage County, say. (At one time, DuPage County was trying to collect all the FEMA models; I don't know if they were successful.)

So, that's some indication of the extra searching that you may need to do to obtain and sort the subject data. I will send some scans with further explanation when I can, possibly separately by stream.

- Bill

Winograd, Esther B

From: Saylor, William F [wsaylor@illinois.edu]
Sent: Wednesday, February 15, 2012 5:04 PM
To: Winograd, Esther B
Subject: RE: I-55 in Dupage Counties

Esther:

I have bundled the data that I have regarding Sawmill Creek and tributaries crossing I-55, in the following zip file that you can download from the link shown:

/wsaylor/Sawmill Creek/SawmillCk-andtribs_ModelsEtcFromISWS-FPI.zip
https://netfiles.uiuc.edu/xythoswfs/webui/_xy-41853047_2-t_BLhlyVzc

The files in it are named by stream as follows:

SawmillCk (main stem)
SawmillCkEBr aka Trib 1
SawmillCkWBr
Wards Creek aka Trib B of Sawmill Creek West Branch

and within these the filenames sort alphabetically upstream to downstream, more or less.

Each, here, except Sawmill Creek East Branch, have LOMRs in the upper reaches (above I-55) as previously noted.

It turns out that I have the model data for the lower reaches, the source being a printout of Fldwy WSP2 input data, only. For reasons I can't fully account for, I wrote this data off when I originally looked at it ten years ago, but upon closer review, I find it represents the flood profiles originally in the DuPage County Unincorporated Areas 1982/1985 FIS below and across I-55. It is apparently the SCS 1975 Flood Plain Information study model data. In this process I converted the still-effective portion of this data to electronic format (in SawmillCk_Uninc_FPI-WSP2-1975copy.zip within the bundle) and also included the image scan of its source.

Misc notes to be aware of:

- In that lower model data file, the highest Q is the Q100. Thus, the 100-year flood elevation are the last line in each section output and not the second to last line per usual.

- I-55 is not necessarily modeled in the data.

- Shortly above I-55, the later versions or LOMRs apply.

- The treatment of the reaches of Wards Creek vs Sawmill Creek West Branch below I-55 isn't all that clear to me.

- The electronic data for Wards Creek (the other embedded zip file) is associated with an upstream LOMR case, but the data starts at I-55.

I do not have applicable data for Black Partridge Creek after all, FYI.

Good luck.
- Bill

Questions concerning the VERTCON process may be mailed to NGS

Latitude: 41.736643

Longitude: 87.957686

NAVD 88 height: 700 FT

Datum shift(NAVD 88 minus NGVD 29): -0.279 feet

Converted to NGVD 29 height: 700.279 feet

Peak Streamflow for the Nation

USGS 05533400 SAWMILL CREEK NEAR LEMONT, IL

Available data for this site: Surface-water: Peak streamflow GO

Du Page County, Illinois
Hydrologic Unit Code 07120004
Latitude 41°42'28", Longitude 87°57'46" NAD83
Drainage area 13.0 square miles
Contributing drainage area 13.00 square miles
Gage datum 630.00 feet above NGVD29

Output formats

- Table
- Graph
- Tab-separated file
- peakfq (watstore) format
- Reselect output format

Water Year	Date	Gage Height (feet)	Stream-flow (cfs)
1961	Sep. 14, 1961	1.59	924
1962	Mar. 12, 1962	-0.86	195
1963	Apr. 30, 1963	-1.62	59.0
1964	1964		156[4,B]
1965	1965		395[4,B]
1966	May 12, 1966	1.72	984
1967	Jun. 10, 1967	1.08	725
1968	Aug. 17, 1968	0.29	472
1969	Apr. 04, 1969	0.55	541
1970	May 14, 1970	-0.50	279
1971	1971		385[4,B]
1972	Aug. 26, 1972	1.49	883
1989	Sep. 01, 1989	13.17	912
1990	May 09, 1990	15.46	1,730
1991	Nov. 27, 1990	14.57	1,260
1992	Dec. 08, 1991	11.41	241[D,E]
1993	Jun. 07, 1993	15.60	1,600
1994	Aug. 11, 1994	12.56	526
1995	Jan. 14, 1995	12.43	456
1996	Jul. 18, 1996	17.53	3,070[C]
1997	Feb. 21, 1997	14.64	1,360[C]
1998	Aug. 04, 1998	13.75	968[C]
1999	Apr. 09, 1999	12.61	576[C,D]

1973	Dec. 30, 1972	1.06	718
1974	May 16, 1974	0.88	654
1975	Apr. 18, 1975	1.72	984
1976	Jun. 13, 1976	1.69	970
1977	Sep. 01, 1977	0.53	535
1978	Jul. 21, 1978	1.37	835
1979	Mar. 04, 1979	1.57	916
1986	Sep. 26, 1986	12.52	494
1987	Aug. 26, 1987	13.50	560
1988	Dec. 20, 1987	12.76	396
2000	May 28, 2000	12.87	655[C]
2001	Feb. 09, 2001	12.26	479[C,E]
2002	May 12, 2002	13.97	1,060[C]
2003	May 09, 2003	11.90	387[C,E]
2004	Aug. 28, 2004	12.74	615[C]
2005	Jan. 13, 2005	12.42	522[C]
2006	Sep. 11, 2006	11.81	493[C,E]
2007	Oct. 03, 2006	12.99	821[C]
2008	Sep. 14, 2008	13.07	832[C]
2009	Dec. 27, 2008	13.60	1,020[C]
2010	Jul. 24, 2010	13.41	948[C]
2011	Jun. 09, 2011	13.67	1,040[C]

Peak Streamflow Qualification Codes.

- 4 -- Discharge less than indicated value, which is Minimum Recordable Discharge at this site
- B -- Month or Day of occurrence is unknown or not exact
- C -- All or part of the record affected by Urbanization, Mining, Agricultural changes, Channelization, or other
- D -- Base Discharge changed during this year
- E -- Only Annual Maximum Peak available for this year

Questions about sites/data?
Feedback on this web site
Automated retrievals
Help

Data Tips
Explanation of terms
Subscribe for system changes
News

Accessibility Plug-Ins FOIA Privacy Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey

Title: Surface Water for USA: Peak Streamflow
URL: http://nwis.waterdata.usgs.gov/nwis/peak?

Page Contact Information: USGS Water Data Support Team
Page Last Modified: 2012-12-12 16:11:29 EST
0.28 0.29 nadww01

Illinois Department of Transportation

Routine Inspection Report

SN: 022-0513	District: 1	Spans: 1	Appr. Spans: 0	Skew: 45	ADT: 154200	Truck Pct: 12
ADT Un:	Maint. Co: DUPAGE		Twsp:		Status: OPEN, NO RESTRICTIONS	
Facility Carried: I- 55			Feature Crossed: STREAM			
Location: .9 M E OF CASS		Municipality:			Team/Sub Section: 135/551	
Bridge Name:			Material & Type: CONCRETE/CULVERT			
Insp. Intervals Routine: 24			Fracture Critical: 0		Underwater: 0	Special: N/A

90 - Inspection Date:	10/08/13	90C - Temp. (°F):	70	90B1 - In-Depth	☒
Is Delinquent:		Reason:			
90A - Agency Program Manager:	Mastny, SC	90A3 - Consultant Program Manager:			
90A1 - Team Leader:		90A2 - Inspector:	Newsome VD		
90B - Inspection Remarks:					
Previous Inspection	#62 = 4 FOR LARGE SPALL 6X5 @ MID SECTION W/ PRIMARY REINF EXPOSED ; TOTAL SEPAARATION AT S END W/ LONGIT CRACK 1IN TO 1"1/8 ; WATER FLOS THROUGH N END CRACK ON DRY DAY - #61 = 5 FOR NE WW UNDERMINING BY SCOUR EFFECT				

Resources

Time to Inspect(H:M):	1:30	1:30	Traffic Control:			Boat:			Waders	W	W	Snooper:			
Ladder:			Manlift:			Bucket Truck:			Other:	Flashlight							

Inspector's Appraisals

	Prev	New	
58 - Deck Condition:	N	N	
59 - Superstructure Cond:	N	N	
60 - Substructure Cond:	N	N	
62 - Culvert Condition:	4	4	see 90B
61 - Channel Condition:	5	5	see 90B
71 - Waterway Adequacy:	8	8	
72 - Approach Rdwy Align:	8	8	
111 - Pier Navig Protection:	N	N	

90B - Inspection Remarks:

Large Spall 6*5 @ mid section w/ primary reinf exposed; also spall w primary reinf exposed near concrete patch; total separation at S End W/ Longit Crack up to 1"1/8, daylight can be through separation; longit vertical crk at N end has water seepage; NE WW undermining by scour effect.

Additional Inspection Data

	Prev	New
36A - Bridge Railing Adequacy:	N	N

	Prev	New		Prev	New		Prev	New
Approach Guardrail Adequacy: 36B - Transitions:	N	N	36C - Guardrail:	3	3	36CD - Ends:	3	3

	Prev	New	
108A - Wearing Surface Type:	N	N	If 'L-Other' Describe:
108B - Type of Membrane:	N	N	If 'E-Other' Describe:
108C - Deck Protection:	N	N	If 'I-Other' Describe:
108D - Total Deck Thickness (In.):	0.0	0	

59A - Paint Date(Mo/Yr):			
59B - Paint Type:			Color: Fascia - _____; Inter. - _____; Railing - _____.
59C - Utilities Attached:	N N N	N N N	If 'B-Other' Describe:

		Prev	New	
Weight Limit Posting:	70A2 - Single Unit Vehicles:			Tons
	70B2 - Combination Type 3S-1 (3 or 4 axles):			Tons
	70C2 - Combination Type 3S-2 (5 or more axles):			Tons
	70D2 - One Truck at a Time:			

Joint Openings (In.): _____

90B - Inspection Remarks:

	Signature	Date
Inspection Team Leader:	VDN	10/08/2013
Consultant Program Manager:		/ /
Agency Program Manager:		12/2/13

_Deck Surface-Xverse view or

1_Approach-E Approach Look

_0002_Approach-E Approach

‹ Surface-Roadway Over Culv

ł_Channel-General View of Ch

013108_0005_Elevation-S Ele

_0006_Culvert-General View I

108_0007_Culvert-E Wall Loo

108_0008_Culvert-W Wall Loc

Culvert-Full Depth Crack at S

/ert-Full Depth Crack At S Enc

lvert-Full Depth Crack At S En

ulvert-Full Depth Xverse Crk T

ıll Depth Xverse Crk Top of Cu

ulvert-Full Depth Xverse Crk T

)015_Culvert-General View Lc

ılvert-Central Section Major Sp

)017_Culvert-Longit crack witl

013108_0018_Elevation-N Ele

19_Channel-General View of (

Surface-Roadway Over Culve

_Approach-W Approach Look

?_Approach-W Approach Look

_Deck Surface-Xverse view or

_0024_Culvert-Centrtal Sectio

Illinois Department of Transportation

File (105)

022-0513

Printed

NBI Field Inspection Report

SN: | District: 1 | Spans: | Appr. Spans: | Skew: | ADT: | Truck Pct: | ADT Un:

Facility Carried: I-55 & frontage roads | Name:

Feature Crossed: Stream | Location: 0.9 mi E of Cass St

Inspection Date: 12/20/2011 | Inspection Notes: Station 188+00 Pix @ S:\Structures\South Section Culverts\I-55 Skew\I-55 over Stream 0.9 mi E of Cass

Inspector 1: Mickael D. Muller

Inspector 2:

Temp: 35

Resources

Time to Insp:	Trffc Ctrl:	Boat:	Waders:	Snooper:
1:30			W	
	Ladder:	Manlift:	Other:	
			Flashlight	

Inspector's Appraisals

	Prev	New
58-Deck Condition:		N
59-Superstructure Cond:		N
60-Substructure Cond:		N
62-Culvert Condition:		4
61-Channel Condition:		5
71-Waterway Adequacy:		8
72-Approach Rdwy Align:		8
111-Pier Navig Protection:		N

Additional Inspection Data

	Prev	New
36A-Bridge Railing Adequacy:		N
Approach Guardrail Adequacy: 36B-Transitions:		N
36C-Guardrail:		3
36D-Ends:		3
108A-Wearing Surface Type:		N
108B-Type of Membrane:		N
108C-Deck Protection:		N
108D-Total Deck Thickness (In.):		
59A-Paint Date (Mo/Yr):	/	
59B-Paint Systems:		
59C-Utilities Attached:		NNN
70D2-Posting OTAT:		
70A2-Single:		
70B2-Comb 3S1:		
70C2-Comb 3S2:		

Remarks: #62 = 4 for large spall 6'x5' @ Mid section w/ primary reinforcement exposed; Total separation @ S end w/ crack ≈ 1" to 1 1/8" (longit. crack); and water flowing through N end crack on dry day
#61 = 5 for NE WW scour (undermined)

Inspected By: MDM

12/20/11

Illinois Department of Transportation

File 105

Culvert Inspection Report

Culvert Number: _____ *(to be filled in by Office)*

*** Location & Inventory Information ***				
Facility Carried:	I-55 & Frontage Rd	Feature Crossed:	Stream	Team Section 137
Location:	0.9 mi E of Cass	Municipality:	Willowbrook	16 - Cook
Total # Cells:	1	Material:	Concrete	19 - Culvert
Cell Height:	5	Skew:	45	
Cell Width:	10	Culvert Opening:	50	AASHTO: 14.2
Amount of Fill:	5	Deck Thickness:	N/A.	Station 188+00
# of Lanes:	10			

90 – Inspection Date:	12/20/2011	90C –Temperature (°F):	35
90A – Inspection Leader:	Michael D. Muller		

Inspector's Appraisal

61 – Channel and Channel Protection Condition Condition: 5

Description of any deterioration:

Scour @ N end undermining NE WW.

62 – Culvert Condition: 4

Description of any deterioration:

- Large spall @ mid section - primary reinf exposed. 6'x5'
- Total separation @ S End - Crack about 1" to 1 1/8" wide - (longit)
- Water flowing through crack @ N end, even on dry days.

90B –Inspection Access Remarks:

	Signature	Date	Inspection Entry
Inspector:	MDM	12/20/11	

Culvert Inspection Report

Culvert Number: _____

Repairs Needed:

Additional Comments:

Old patch present but not sufficient.

Sketch of Culvert Layout and Dimensions:

01 - W approach Frontage Rd.jpg

02 - Xverse view on I-55 NB and station.jpg

03 - Stream lkg S.jpg

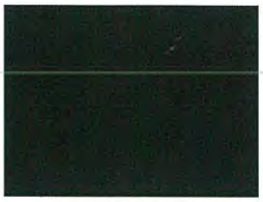
04 - E approach lkg E and location.jpg

05 - S elevation.jpg

06 - Longit crack w water seeping and rust.jpg

07 - Typ S end culvert condition.jpg

08 - Full depth crack at S end total separation.jpg



09 - Full depth crack at S end total separation No...

10 - Full depth crack at S end total separation.jpg.jpg

11 - Central section major spall w primary reinf expos...

12 - Central section major spall w primary reinf expos...

13 - Central section major spall w primary reinf expos...

14 - Central section old patch.jpg

15 - Central section old patch.jpg

16 - Water flowing several days after latest rain.jpg

17 - N Elevation.jpg

18 - Scour issue undermining NE WW.jpg

CIORBA GROUP | Consulting Engineers

CULVERT INSPECTION TECH MEMO

To: Carlos Feliciano

From: Brett Sauter PE, SE, Inspection Team Leader
Checked by: Mark Johnson PE, PTOE, Project Manager

Date: 3/3/2016

Reference: I-55 over the East Branch of Sawmill Creek Culvert
SN 022-0513; Job No. P-91-762-10

Project No.: 20172.09

On Friday January 15th, 2016 Ciorba Group performed an overall culvert inspection for the structure carrying I-55 over the East Branch of Sawmill Creek to verify the condition of the structure and recommend a proposed scope of work. The last NBIS inspection was performed on October 8, 2013. The project is located in Downers Grove Township in DuPage County, Illinois (See Exhibit A for Location Map).

Existing Condition of the Culvert Based on Ciorba's Inspection

The culvert is currently rated as being in poor condition. Based on field measurements, the culvert opening is 12' x 5'.

Inspection of the culvert revealed a large (1½" minimum width) transverse crack in the top slab and extending into the sidewalls and bottom slab approximately 55' from the south end of the culvert (Photos 1 & 2). Daylight could be seen through the top slab. The south end of the culvert has detached from the remainder of the culvert due to the cracking. A similar complete cracking and separation was found approximately 63' from the north end of the culvert (Photo 3). Both of these cracks are located in the ditch area between I-55 and the adjacent frontage roads. Throughout the length of the culvert there are several drainage pipes that penetrate the culvert walls and drain into the culvert, both reinforced concrete pipe (RCP) and corrugated metal pipe (CMP). At the locations where the severe cracking was documented, the inverts of the CMP's were severely corroded, allowing water to undermine the culvert at these locations potentially causing the cracking due to an unstable foundation (Photo 4). This failure of the drainage pipe has eroded the soil and can be seen from the ditches above the culvert (Photo 8). The lengths of the CMP's as provided by IDOT: NW corner – 40 ft., NE corner – 64 ft., SE corner – 56 ft., SW corner – 41 ft.

Two large spalled areas were found in the top slab in the center area of the culvert (Photo 5). Numerous hairline transverse cracks were observed in areas of the culvert located underneath I-55, typical for a culvert of this age. There are areas of scour noted including the northeast wingwall (Photo 6) and the south end of the culvert, which has a majority of the toewall exposed (Photo 7). The slope just east of the northeast wingwall has failed (Photo 9). This slope failure is undermining the frontage road guardrail.

Photos from the most recent inspection showing the current condition of the structure are attached

at the end of the memo. In addition, a sketch showing the location of the defects is attached.

Potential Scope of Work

The culvert was last load rated on August 10th, 2012 and received an inventory rating factor of 0.75 and an operating rating factor of 1.25. Due to the deterioration of the culvert and the severe cracking and complete separation of the culvert at both ends, repair is required before further deterioration occurs. Two options have been considered: 1) Repair of the culvert and 2) Partial replacement of the culvert in the locations of the cracking. It is anticipated that both options will not require the shutdown of any lanes of traffic on I-55. A third option of relining the culvert to repair the perimeter cracks was considered, however since an underlying foundation issue appears to be the cause for the defects, the culvert lining option was dismissed.

Option 1-Culvert Repair

In this option, the cracks at the north and south ends will be repaired. In order to prevent any future cracking due to settlement, a settlement collar will be placed at the repaired locations. This will require excavation in the areas of the cracks, concrete removal and the placement of a concrete collar. The deteriorated CMP and RCP pipes that connect to the north and south ends of the culvert will be replaced with RCP pipes. Concrete structural repairs will be performed in spalled and delaminated areas. The undermined northeast wingwall will be re-graded and channel protection (such as riprap) installed at the north and south ends of the culvert. The cost for this option is estimated at $147,000. It is anticipated that traffic control such as temporary concrete barrier and shoulder closures will be needed along the frontage roads and I-55 during this repair due to the excavation, however the costs for the traffic control are not included. See Exhibit B, Option 1 for a complete cost estimate.

Option 2-Partial Culvert Replacement

In this option, the existing culvert from the large perimeter crack to the end of the culvert on both the north and south ends will be removed and replaced with a new culvert of the same geometry. The new culvert will be connected to the existing with a settlement collar in order to prevent any future cracking due to settlement. The deteriorated CMP and RCP pipes that connect to the north and south ends of the culvert will be replaced with RCP pipes. Concrete structural repairs will be performed in spalled and delaminated areas of the remaining culvert and scour protection will be installed at the culvert openings. The option will require a detour for both the I-55 frontage roads during the removal and replacement. The costs for traffic control and patching of the frontage roads after the culvert replacement is not included in the cost estimate. The cost for this option is estimated at $464,000. See Exhibit B, Option 2 for a complete cost estimate.

Recommended Scope of Work

The recommended option is Option 2-partial culvert replacement. Although it is the more expensive option, it will provide a more lasting solution by rebuilding the affected areas of the culvert on a solid foundation.

Photo 1: Underside of top slab showing large crack through top slab at south end.

Photo 2: Large crack in top slab of culvert at south end visible in ditch of I-55.

Photo 3: Underside of top slab showing large crack at north end.

Photo 4: Severely corroded CMP in west wall near the south end of culvert. Typical at other CMP locations.

Photo 5: Underside of the top slab with large spall, center of culvert.

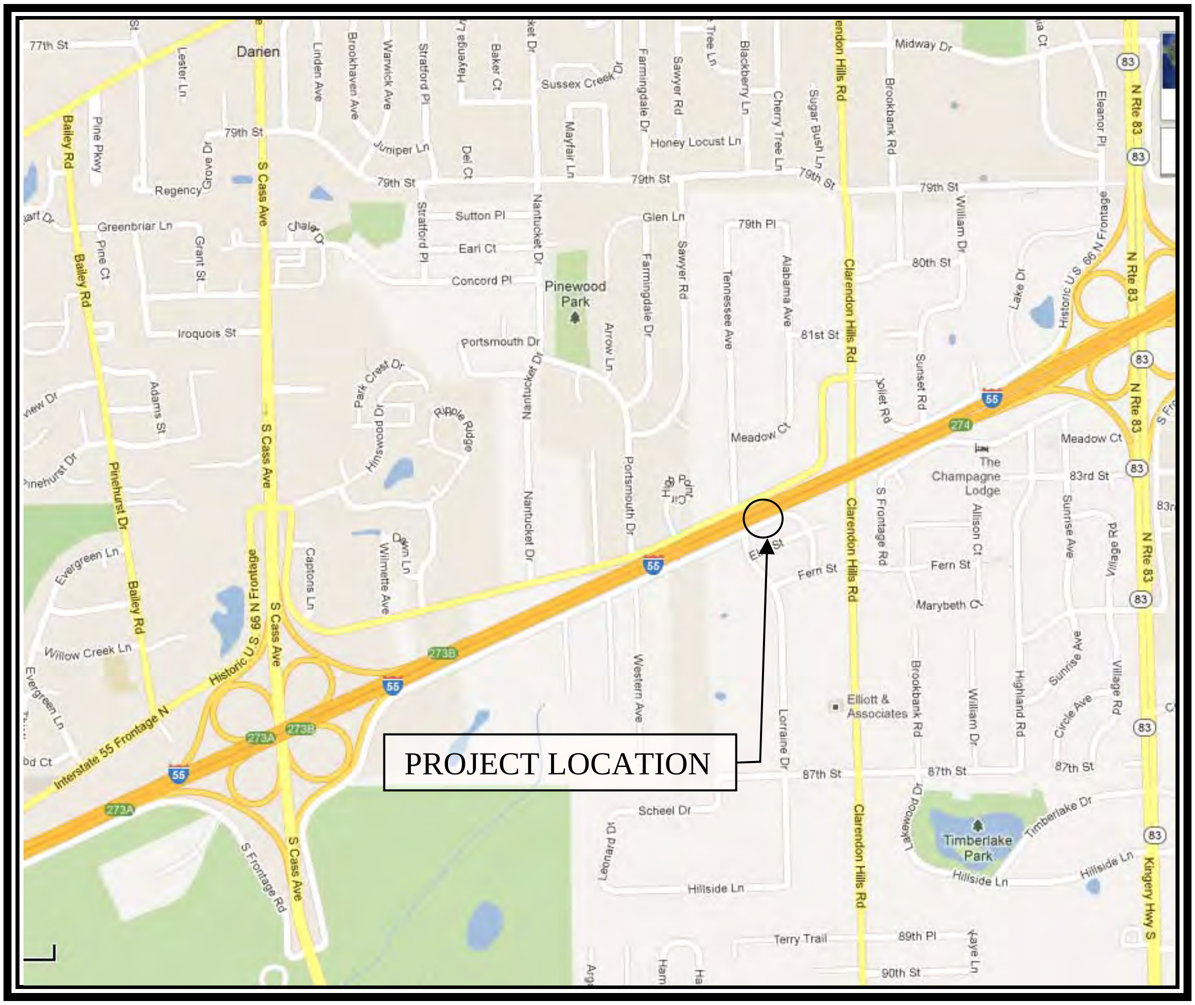
Photo 6: Northeast wingwall with footing exposed due to scour.

Photo 7: South end of culvert showing scour.

Photo 8: South I-55 ditch showing erosion. Top and side of culvert is visible under grass.

Photo 9: Slope failure at northeast wingwall.

LOCATION MAP



I-55 (FAI 55)
Over EB Sawmill Creek
DuPage County
Downers Grove Township
P-91-762-10
SN 022-0513

Exhibit A

Option 1 – Culvert Repair
Construction Cost Estimate
SN 022-0513 I-55 over EB Sawmill Creek

Scope of Work

1) Repair perimeter cracks and install settlement collars.
2) Perform formed concrete repairs on remaining barrel.
3) Regrade northeast wingwall and add channel protection.
4) Replacement of pipes draining into culvert included in drainage costs.

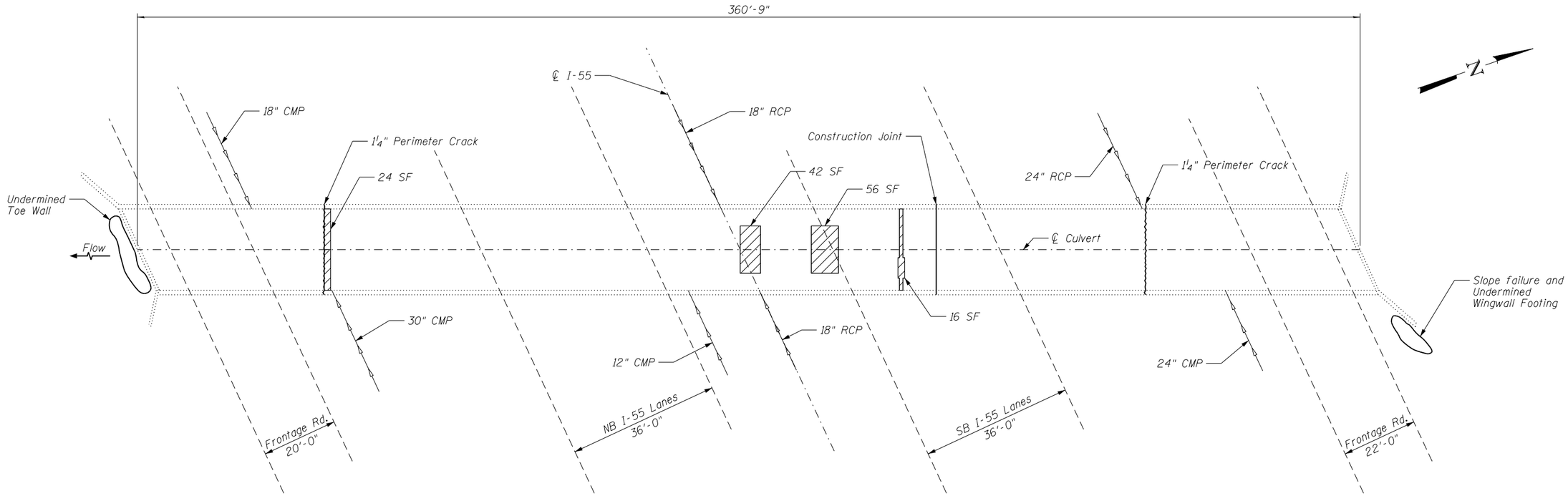
PAY ITEM #	ITEM	UNIT	TOTAL	UNIT PRICE	TOTAL COST
28100107	Stone Riprap, Class A4	Sq. Yd.	38	$ 120.00	$ 4,560
50102400	Concrete Removal	Cu. Yd.	8.3	$ 800.00	$ 6,640
50200100	Structure Excavation	Cu. Yd.	112	$ 40.00	$ 4,480
54003000	Concrete Box Culverts	Cu. Yd.	15.9	$ 1,200.00	$ 19,080
50800205	Reinforcement Bars, Epoxy Coated	Lb.	4,000	$ 1.50	$ 6,000
Z0012754	Structural Repair of Concrete (Depth equal to or less than 5")	Sq. Ft.	126	$ 150.00	$ 18,900
Z0073002	Temporary Soil Retention System	Sq. Ft.	482	$ 80.00	$ 38,560
	Culvert Costs				$ 98,300
	Drainage Costs (Pipe Replacement)				$ 19,200
	Miscellaneous - 10% of Culvert Costs				$ 9,900
	Contingency - 20% of Culvert Costs				$ 19,700
				Total Cost	$ 147,000

Option 2 – Partial Culvert Replacement
Construction Cost Estimate
SN 022-0513 I-55 over EB Sawmill Creek

Scope of Work

1) Removal of 55' of the south end and 63' of the north end of the culvert.
2) Replace with new culvert of identical dimensions with settlement collar.
3) Perform repairs on remaining barrel section.
4) Frontage road will be detoured during reconstruction of the culvert.
5) Replacement of pipes draining into culvert included in drainage costs.

PAY ITEM #	ITEM	UNIT	TOTAL	UNIT PRICE	TOTAL COST
28100107	Stone Riprap, Class A4	Sq. Yd.	38	$ 120.00	$ 4,560
50100100	Removal of Existing Structure	Each	1	$ 70,000.00	$ 70,000
50102400	Concrete Removal	Cu. Yd.	4.2	$ 800.00	$ 3,360
54003000	Concrete Box Culverts	Cu. Yd.	150	$ 1,200.00	$ 180,000
50800205	Reinforcement Bars, Epoxy Coated	Lb.	29,000	$ 1.50	$ 43,500
Z0012754	Structural Repair of Concrete (Depth equal to or less than 5")	Sq. Ft.	126	$ 150.00	$ 18,900
Z0073002	Temporary Soil Retention System	Sq. Ft.	270	$ 80.00	$ 21,600
	Culvert Costs				$ 342,000
	Drainage Costs (Pipe Replacement)				$ 19,200
	Miscellaneous - 10% of Culvert Costs				$ 34,200
	Contingency - 20% of Culvert Costs				$ 68,400
				Total Cost	$ 464,000



LEGEND:

Spalled or Delaminated Concrete

Perimeter Cracks

GENERAL PLAN

Underside of Top Slab shown

NOTES:

1. Location and dimensions of I-55 lanes and frontage roads is approximate.
2. Hairline cracks not shown for clarity.

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CONSULTING ENGINEERS
5507 North Cumberland Avenue, Suite 402 Chicago, Illinois 60656
Tel. 773.775.4009 Fax 773.775.4014 Email chicago@ciorba.com

I-55 @ SAWMILL CREEK

GENERAL PLAN

SCALE: NTS
DATE: 2/23/2016
DRAWN BY: SBA
CHECKED BY: BWS

DATE: 2/23/2016
FILENAME: N:\PROJ\2020\2172.2000\2017\2.09\Structural\Plans\12020172.09_GPIE.dgn

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

Wiss, Janney, Elstner Associates, Inc.
330 Pfingsten Road
Northbrook, Illinois 60062
847.272.7400 tel | 847.291.4813 fax
www.wje.com

July 17, 2012

Mr. John Fortmann
Deputy Director, Acting
Region One Engineer
Illinois Department of Transportation
201 West Center Court
Schaumburg, IL 60196-1096
Attn: Ms. Sarah Wilson (Maintenance Bridge Engineer)

Re: Core Collection and Testing
Bridge 022-0513 I-55 and Frontage Roads over Stream
District One
Work Order No. 16
WJE No. 2009.3645.16

Dear Mr. Fortmann:

Wiss, Janney, Elstner Associates, Inc. (WJE) has completed the collection and testing of concrete core samples from the structure at I-55 and frontage roads over a stream (Structure No. 022-0513). This letter summarizes field work and the core strength testing results.

Structure Description

The structure at structure at I-55 and frontage roads over a stream is a single-cell reinforced concrete box culvert. The culvert is 360 ft. long and the cell width and height are 12 ft. and 6 ft., respectively. The structure spans east to west and carries two lanes of traffic at each frontage road on the north and south sides, and three lanes each of northbound and southbound I-55 for a total of 10 traffic lanes. A metal guardrail is present at both sides of the north frontage road and the south side of the south frontage road. The median of I-55 is delineated by a Jersey-style barrier. A view of the south elevation of the structure is shown in Figure 1.

Core Collection & Field Observations

Concrete core collection was completed on May 21, 2012. All core samples were collected from the top slab portion of the structure only. The cores were collected using a 4" diameter core barrel powered by a hydraulic core rig in accordance with AASHTO Specification T24. The cores were collected from inside the structure near midspan of the cell. Based on field observations, the average distance from the top of the roadway to the top of the culvert top slab is 14 in. The core locations were specified to coincide with a single wheel path from each of the traffic lanes. A reinforcing bar locator was used to identify reinforcement locations and core locations were adjusted to minimize damage to reinforcing bars. Core locations were adjusted as needed to avoid cracks or other defects in the concrete. All core locations are identified on Sheet 1 in Appendix A. All collected cores were documented for length and composition. Finally, all cored holes were patched using BASF Set 45 repair mortar.

In addition to the coring operations, a brief inspection of the structure was completed to identify any significant defects. A large spall with exposed, corroding reinforcing bar was observed near the median of I-55. This is shown in Figure 2. Also, large cracks were observed approximately 50 ft. from each end of the culvert. Figure 3 shows a typical view of one of these cracks.

Concrete Strength Data

All applicable cores were tested for compressive strength in accordance with AASHTO Specification T24. The compressive strength data is summarized in Table 1.

Cores #5 and #6 had a length to diameter ratio less or equal to 1.75. Therefore, the resulting compressive strengths were corrected to account for the insufficient length. The specification states that the current correction factors are only applicable to concrete with strengths less than 6000 psi. We have applied the correction factors to all compressive strength results regardless of the measured strength. This practice is a conservative approach to account for samples with low length to diameter ratios. The IDOT concrete core testing forms are included for all cores in Appendix B.

Table 1 - Concrete Compressive Strength Data

Location:	Compressive Strength
Core #1	11,150 psi
Core #2	7,210 psi
Core #3	7,340 psi
Core #4	7,300 psi
Core #5	8,030 psi
Core #6	6,760 psi
Core #7	6,470 psi
Core #8	7,000 psi
Core #9	8,850 psi
Core #10	8,500 psi

Please contact us with any questions or if you require additional information. We appreciate the opportunity to assist IDOT with this work.

Sincerely,

WISS, JANNEY, ELSTNER ASSOCIATES, INC.

Joseph A. Rogers Jr., S.E.
Project Associate

Jonathan C. McGormley, P.E., S.E.
Project Manager

Figures

Figure 1. South elevation of I-55 and frontage roads over a stream.

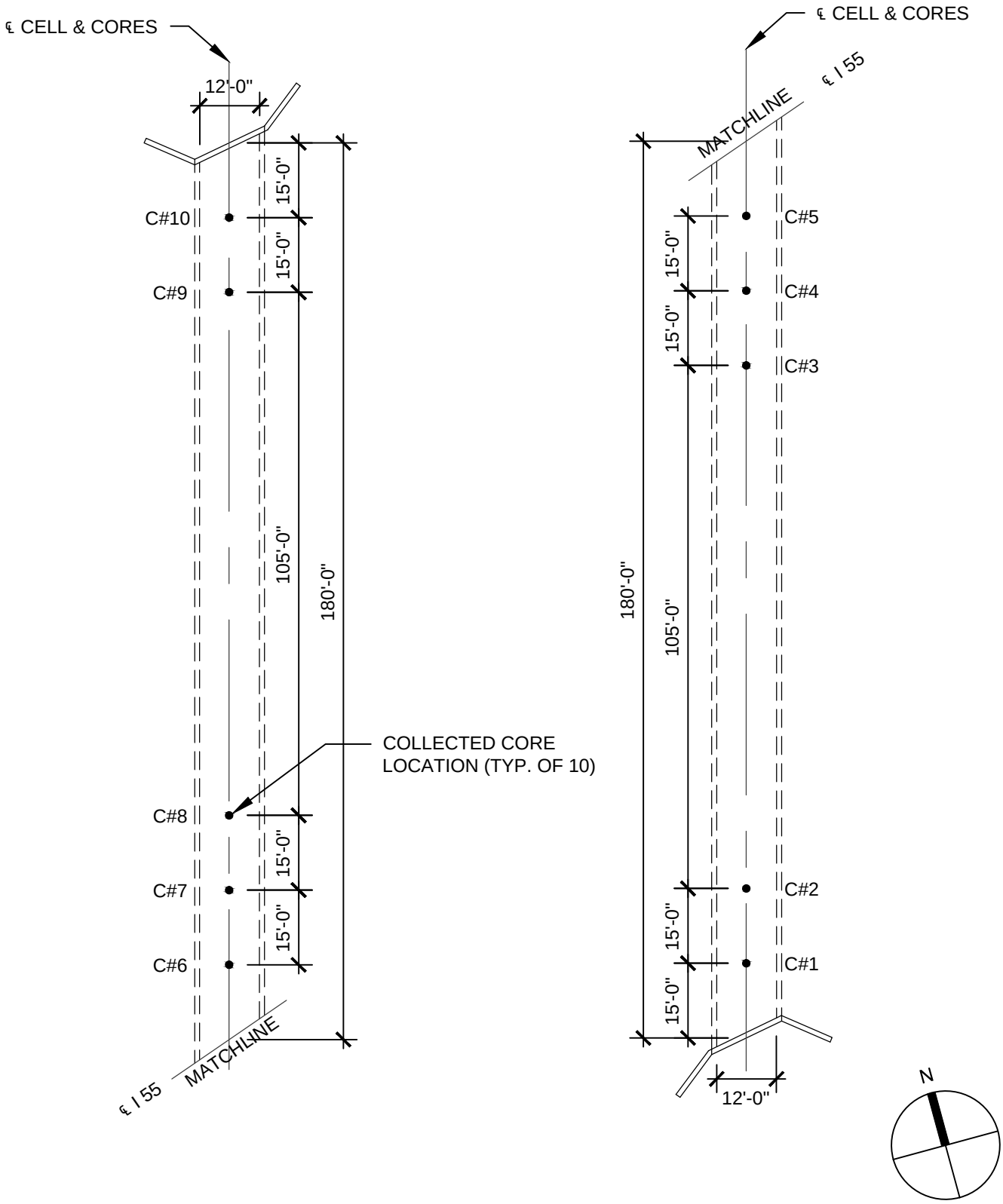
Figure 2. Large spall with exposed, corroding reinforcing bar near the median of I-55.

Figure 3. Large cracks in top slab and walls. Similar cracks observed approximately 50 ft. from each end.

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

Appendix A

Core Location Sketch, Structure 022-0513



WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

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Headquarters & Laboratories: Northbrook, Illinois
Atlanta | Austin | Boston | Chicago | Cleveland | Dallas | Denver | Detroit
Honolulu | Houston | Los Angeles | Minneapolis | New Haven | New York
Princeton | San Francisco | Seattle | Washington, D.C.

Project	Structure 022-0513 I 55 & Frontage Roads over Stream
Client	Illinois Department of Transportation 201 West Center Court, Schaumburg, Illinois
Sheet Title	Core Sample Location Sketch

Proj. No.	2009.3645.16
Date	05.07.2012
Drawn	JAR
Checked	TK
Scale	NTS
Sheet No.	1

File Name: \\WJENBFP\Projects\2009\3601-3700\2009.3645 - IDOT Eng. Services\WorkOrder16_CulvertCoring\Field Sheets\CoreLocations_16.dwg
Plotted: 7/8/2012 6:03 PM by Krahn, Tyler

EXHIBIT O

SURVEY NOTES

FB168 PG 73

01/10/13
TW/DW
SUNNY 45°

110203 I55 - STREAM 4

FILE 20120110TW PTS - 1357 - 1488

HE 1.296 BASE @ 201216

1845224.184

1083444.575

691.07

CHECK @ CP 201217

1845886.424

1084869.042

691.068

9/7 GPOP 2.60
CHECK # 1357

1845886.4353

1084869.0232

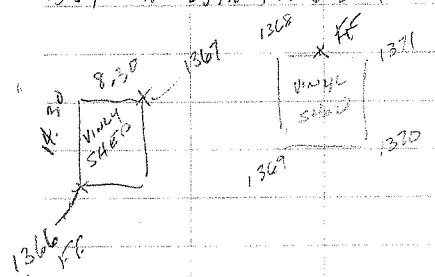
690.9478

847 8946133

500'S. = 686.50

1000S = 685.00

1357 HR 25.10 HOT 6.5617



FB168 PG 75

01/11/13
TW/DW
RAIN 60°

110203 I 55 STREAM 4

FILE 20120111TW PT 1409 -

HE = 1.247 BASE @ CP 201215

1844559.196

1082004.674

692.144

NORTH

CHECK @ CP 20121

CHECK # 1409

ROW 689.0

1845224.184

1845224.1882

MID SECTION 690.20

1083444.575

1083444.5146

500' 691.20

691.070

691.0460

1000' 692.00

1409 - 1529

HI 4.87
HR 6.0 TE CP 1529 BS CP 1528

CHECK 1530

1847253.6127

1847188.6102

1847188.6176

1086876.2282

1086808.9535

1086808.7294

689.1102

689.0568

688.9868

CHECK 1540

1847188.6227

1086808.9328

688.9890

FB 168 Pg 62

01/07/13
TM/DW/CR
Sunny 20°F

110203 555 - Stream 4

HI 5.17 HR 6.0	TE CP 0025	BS CP 0024	CHECK # 1280
	1846702.0229	1846554.0909	1846554.0818
	1086768.8933	1086442.8182	1086442.8132
	688.2757	688.1600	688.1444

N.S. 106
ROW 689.0
MID SECTION 690.20
500 691.20
1000 692.0

S. 3.106
ON 687.75
00 686.50
00 685.0

PTS - 1280 - 1342

INST. OUT OF LEVEL

HI - 5.06 HR - 6.0	TE CP 0024	BS CP 0025	CHECK #1343
	1846554.0909	1846702.0229	1846702.0369
	1086442.8182	1086768.8933	1086768.9026
	688.1600	688.2757	688.3175

CHECK 1356
1846702.0044
1086768.7456
688.3149

SOUTH SIDE NEED 4 to 2 S

1/8/14 1103

FILE 010814EK

ADD'L DRAINAGE SURVEY

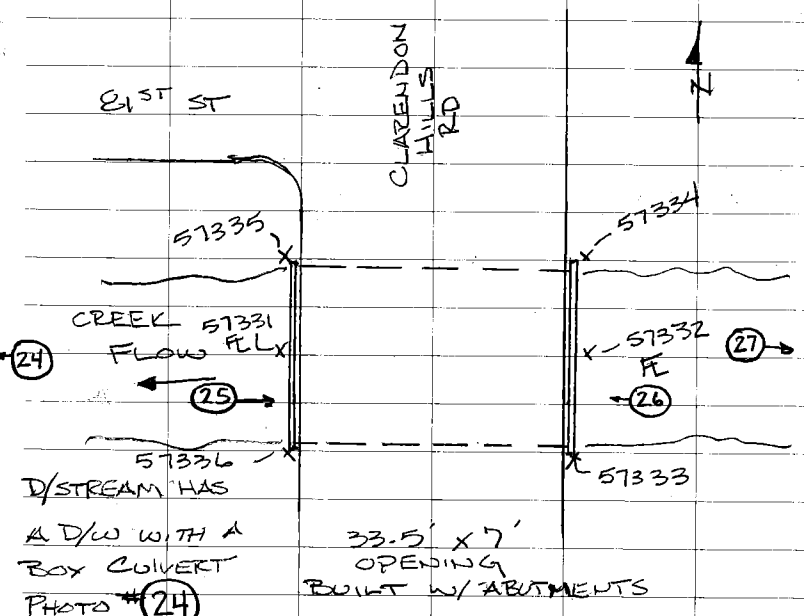
BASE SET-UP @ PT # 201221

HT 5.33

START PT # 57318

57318 CK 201222 N-0.08 E 0.06 V-0.04

CLARENDON HILLS CULVERT



D/STREAM HAS A D/W WITH A BOX CULVERT PHOTO #24

33.5' x 7' OPENING BUILT W/ ABUTMENTS

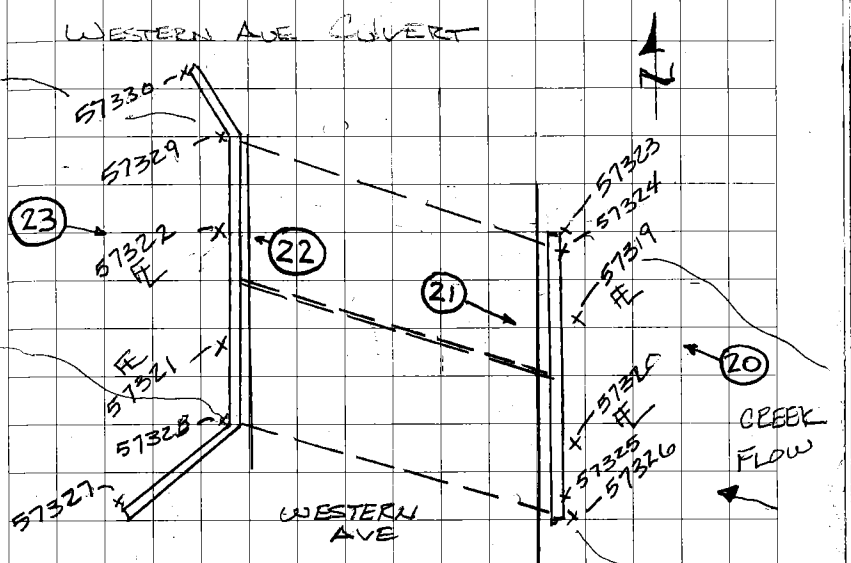
NOT A BOX CULVERT

18" HEADWALL

47

CREW EK/CW 3° PT'LY CLOUDY W/ 12+" SNOW

WESTERN AVE CULVERT



DOUBLE 9'x12' BOX CULVERT

THE (S) BOX IS FULL OF DEBRIS

9" WIDE HEADWALL

57337 CK 201217

N: 0.07 E: 0.03 V: 0.11

POINT RANGE

57318 - 57337

EXHIBIT P

COMPUTER DISC OF HYDRAULIC MODELS